KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT)
(Deemed to be University)
DEPARTMENT OF MATHEMATICS

SCHOOL OF APPLIED SCIENCES

PROPOSED SYLLABUS

(Common to all branches of Engineering)
3rd Semester

Proposed Course Name: Probability and Statistics

Code: MA 21001   **Credit: 4 (3-1-0)**

Prerequisite: Intermediate mathematics

Course Objective: The objective of this course is to familiarize the students with the foundation of probability and statistics and to use it in solving the problems arises in engineering and real life applications.

Course (learning) Outcomes: At the end of the course, the students will be expected to:

CO1: understand basic probability and its applications
CO2: study probability distributions and can use it in real life data analysis
CO3: have a knowledge on univariate and bivariate distributions and their properties
CO4: measure the central tendency and dispersion of a data set to draw conclusion from the data and interpret the data with the appropriate pictorial representation.
CO5: have good understanding of the Central Limit Theorem and its applications
 CO6: analyze the statistical inference

Detailed Syllabus:

Probability and random variables:[CO1 & CO2]   **(20-hrs)**

Basic concepts of sample space, events(with example), Axiom of Probability, Conditional Probability, Bayes' Theorem and its applications. Discrete random variable, probability mass function, cumulative distribution function and Moment Generating function for discrete random variable, some special distributions like Uniform distribution, Geometric distribution, Binomial distribution, Negative Binomial distribution, Poisson distribution, Hypergeometric distribution, mean and variance. Continuous random variable, density function, cumulative distribution function and Moment Generating function. Uniform distribution, normal distribution, mean, variance, percentile and critical value of normal distribution, normal approximation of the binomial distribution and exponential distribution.

Joint probability and distributions:[CO3]   **(10-hrs)**

Joint probability mass function and marginal probability mass function, joint probability density function and marginal probability density function, concept of independent random variable(joint probability), conditional probability mass function and conditional probability density function. Expected value, covariance and correlation for jointly distributed random variable(both continuous and discrete).

Descriptive Statistics: [CO4]   **(12-hrs)**

Frequency distribution, pictorial and tabular representation of data, stem and leaf display, dot plots, histogram, box plots and comparative box plots. Basic concepts on mean, median and mode, Skewness, Kurtosis, Correlation, Coefficient of Correlation, rank correlation, Regression Analysis: Least square method.

Inferential statistics:[CO5 & CO6]   **(14-hrs)**

Population, sample, random sample, sampling distribution, distribution of sample mean, central limit theorem, point estimator, point estimation of parameter using method of maximum likelihood estimation, confidence interval, confidence interval for the mean of a normal population with known and unknown variance, confidence interval for the variance of a normal population, hypothesis testing, one sided and two sided alternatives, Tests for mean of the normal distribution with known variance, Tests for mean of the normal distribution with unknown variance, tests for variance of the normal distribution.

Text books:

T1.   Probability and Statistics for Engineers and Sciences by J. L. Devore, CENGAGE Learning, 9th Edition.

T2.   Advanced Engineering Mathematics by Erwin Kreyszig, Wiley, INC, 10th Edition.

Reference Books:

R1.   Introduction to Probability and Statistics for Engineers and Scientists by S.M. Ross, Elsevier/AP, 6th Edition.

R2.   Introduction to Probability and Statistics by J.S. Milton & J.C. Arnold, Mc Graw Hill, 4th Edition.

R3.   Introduction to Probability Theory and Statistical Inference by H.J. Larson, John Wiley & Sons Inc, 3rd Edition.

R4.   Fundamental of Mathematical Statistics by S.C. Gupta & V.K.Kapoor, S. Chand, 12th Edition.