Probability & Statistics

Credit Hours 3+0

Course Code

# Course Learning Objectives:

This course covers the role of statistics in engineering, probability, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distributions, random sampling and data description, point estimation of parameters, statistical intervals for a single sample, and tests of hypotheses for a single sample

# Course Learning Outcomes

After successfully completed the course, you will be able to demonstrate knowledge and understanding of

**CLO-1:** Measure of central tendency, MGF, Basic principles of probability, and sample spaces. Describe distributions using graphs and numerical descriptors and Correlation

**CLO-2:** Discrete distributions (Binomial, Geometric, Negative Binomial, Hyper geometric, and Poisson) and continuous distributions (Uniform, Normal). Evaluating estimators, construct confidence intervals, and perform hypothesis tests

# Assessment / Evaluation:

Assignment + Class Quizzes 20 %

Midterm Examination: 20%

Final Examination 60%

## Assignment:

Assignment would be assigned at least one week before the due date and be submitted on or before date. No late assignment will be accepted. Total of 3 assignments would be assigned during the semester. You have to be very careful while you are solving your assignment. Please don’t try to copy from someone else in order to avoid any problem at the end of semester.

## Class Quizzes:

To check the class performance, sudden death test or class quizzes would be taken in class throughout the semester. At least 4 quizzes would be taken during the semester. These quizzes have to be solved in the class and they would be of short duration. There would be no LATE submission or MAKEUP for these quizzes.

# Recommended Books:

Probability & Statistics for Engineers &; Scientists, Eight Edition, Ronald E. Walpole & Raymond H. Myers

Theory & Problems of Probability (Schaum’s outline), Seymour Lipschutz, McGraw Hill Book Company

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Probability and statistics |  |  |
|  |  | Topics | CLO | Remarks |
| WEEK 1 | 1 | Introduction, population, sample, data, Calculation of mean median and mode | CLO-1 |  |
| 2 | Variance and Standard deviation | CLO-1 |  |
| 3 | Stem and leaf plot, histogram, Relative frequency histogram | CLO-1 |  |
| WEEK 2 | 4 | Probability, Sample space, tree diagram | CLO-1 |  |
| 5 | Event, Complement related exercise | CLO-1 |  |
| 6 | Intersection, union related exercise | CLO-1 |  |
| WEEK 3 | 7 | Counting sample points, multiplication rule | CLO-1 |  |
| 8 | Permutation, cyclic permutation, permutation of repeated object related problems | CLO-1  CLO-1 |  |
| 9 | Combination and related problems | CLO-1 |  |
| WEEK 4 | 10 | Basic Probability theory, related problems | CLO-2 |  |
| 11 | Additive rule and related problems, Conditional probability | CLO-2 |  |
| 12 | Baye’snile related problem | CLO-2 |  |
| WEEK 5 | 13 | Markov random walks chain related problems | CLO-2 |  |
| 14 | Discrete Probability Distribution, exercise. | CLO-2 |  |
| 15 | Cumulative distribution of discrete probability distribution | CLO-2 |  |
| WEEK 6 | 16 | Continuous Probability Distribution, exercise. | CLO-2 |  |
| 17 | Cumulative distribution of continuous probability distribution. | CLO-1 |  |
| 18 | Moment generating function (MGT) | CLO-1 |  |
| WEEK 7 | 19 | Related problems of probability distribution and cumulative distribution. | CLO-2 |  |
| 20 | Mathematical expectations, mean of probability distribution. | CLO-1 |  |
| 21 | Mathematical expectations, variance of probability distribution. | CLO-1 |  |
| WEEK 8 | 22 | Related exercise of mathematical expectation | CLO-1 |  |
| 23 | Revision for all previous topics. | CLO-1 |  |
| 24 | Binomial probability distribution Exercise | CLO-2 |  |
| WEEK 9 | 25 | Hyper geometric distribution Exercise | CLO-2 |  |
| 26 | Poisson Distribution Exercise | CLO-2 |  |
| 27 | Poisson approximate to binomial. Exercise. | CLO-2 |  |
| WEEK 10 | 28 | Exercise of binomial, hypergeometric and poisson distributions. | CLO-2 |  |
| 29 | Normal distribution, tabulated value of z. | CLO-1 |  |
| 30 | Normal distribution exercise | CLO-1 |  |
| WEEK 11 | 31 | Sampling and sampling distribution (definitions) Sampling with and without replacement, sampling distribution Exercise | CLO-1 |  |
| 32 | Central limit theorem (related exercise) | CLO-1 |  |
| 33 | Central limit theorem (related exercise) | CLO-1 |  |
| WEEK 12 | 34 | Normal distribution and Central limit theorem (related exercise) | CLO-1 |  |
| 35 | Confidence interval with Z distribution | CLO-2 |  |
| 36 | Confidence interval with t distribution | CLO-2 |  |
| WEEK 13 | 37 | Testing of Hypothesis (Basic theory) | CLO-2 |  |
| 38 | Tests of hypothesis, z-test Related problem | CLO-2 |  |
| 39 | z-test related problems (z-table) | CLO-2 |  |
| WEEK 14 | 40 | z-test related problems (z-table) | CLO-2 |  |
| 41 | t- test related problem (t-table) | CLO-2 |  |
| 42 | t- test related problem (t-table) | CLO-2 |  |
| WEEK 15 | 43 | Correlation Related problems | CLO-1 |  |
| 44 | Rank correlation | CLO-1 |  |
| 45 | Regression line related problems | CLO-1 |  |
| WEEK 16 | 46 | Probable error in regression line | CLO-1 |  |
| 47 | Exponential curve fitting related problems | CLO-2 |  |
| 48 | power curve fitting, related problems | CLO-2 |  |