

**Subject: Math-208 (Probability and Statistics for Engineers)**  
**Credit Hour: 3 plus 1 tutorial class**  
**Prerequisite: Math 101 (Calculus and Linear Algebra)**

**Objective:** The objective of course is to provide students with a clear understanding of the basic statistical concepts and tools and to enable them to use these tools as Necessary Avenue for engineering professions and scientific knowledge.

### **Introduction to Statistics and Data Description (8)**

- Graphical Presentation of Data
  - o Dot Plots and Scatter Plots
  - o The frequency Distribution and Histogram
  - o The Stem-and-leaf Plot
  - o The Box Plot
  - o The Pareto Chart
- Numerical Description of Data
  - o Measures of Central Tendency: Mean, Median, Mode, Mean of combined groups, Comparison of mean, median and mode.
  - o Measures of Dispersion: Range, Quartile deviation, Standard deviation & Variance, Coefficient of Variation, Skewness and Kurtosis

### **Probability (6)**

- Introduction
- A Review of Sets
- Random experiment, Sample space and Events (simple and composites), Mutually exclusive and Collectively exhaustive events, Independent events
- Probabilities definition and Assignment
- Finite Sample Space and Enumeration
- Conditional probability
- Partitions, Total probability, and Bayes' theorem and its applications

### **One Dimensional Random Variables (2)**

- Introduction
- The Distribution Function
- Discrete and Continuous Random variable
- Some Characteristics of Distributions (mean, variance)

### **Functions of One Random Variable and Mathematical Expectation (3)**

- Introduction
- Equivalent Events
- Function of Discrete and Continuous Random variable
- Mathematical Expectation.

### **Some Important Discrete Distributions (4)**

- Introduction
- Bernoulli Trials and the Bernoulli Distribution
- The Binomial Distribution
  - o Mean and variance of Binomial Distribution
  - o The cumulative Binomial Distribution
  - o An application of Binomial Distribution
- The Poisson Distribution
  - o Mean and variance of Poisson Distribution
  - o The Poisson Approximation to Binomial Distribution

#### **Normal Distribution (4)**

- Introduction
- Properties of the Normal Distribution
- The Mean and Variance of the Normal Distribution
- The Normal Cumulative Distribution
- The Standard Normal Distribution
- Problem-Solving Procedure
- The Central Limit Theorem
- The Normal Approximation to Binomial Distribution

#### **Random Samples and Sampling Distributions (3)**

- Population and sample, Census and sampling, Estimate and estimator, Parameter and statistic
- Random Samples
- Statistics and Sampling Distributions
- The Chi-Square Distribution
- The  $t$ -Distribution
- The  $F$ -Distribution

#### **Estimation (4)**

- Point Estimation, Interval estimation
- Properties of Estimators
- Single-Sample Confidence Interval Estimation (mean and variance)
- Two-Sample Confidence Interval Estimation (mean and variance)

#### **Tests of Hypotheses (6)**

- Introduction
- Tests of Hypotheses on a Single-Sample (mean and variance)
- Tests of Hypotheses on two Samples (mean and variance)

#### **Simple Linear Regression and Correlation (4)**

- Simple Linear Regression and interpretation
- Correlation and interpretation
- Coefficient of determination

#### **Statistical Quality Control (4)**

- Introduction, Statistical Process Control,
- Control Charts for Measurements
- Control Charts for Individual Measurements
- Control Charts for Attributes

**Textbook:** **Probability and Statistics in Engineering, 4th Edition,**  
by William W. Hines, Douglas C. Montgomery, David M. Goldsman, and Connie M. Borror,  
John Wiley and Sons, Inc, 2003.

#### **Reference Books:**

- o **Miller & Freund's Probability and Statistics for Engineers** by Richard A Johnson
- o **Statistics Concepts and Application** by Nabendu Pal and Sahadeb Sarkar, Prentice Hall of India Private Limited, 2005,
- o **Probability and Statistics** by Purna Chandra Biswal, Prentice Hall of India Private Limited, 2005
- o **Modern Elementary Statistics** by John E. Freund, 6<sup>th</sup> edition, Prentice Hall Int.
- o **Statistics for Management** by R. I. Levin and D. S. Rubin, 6<sup>th</sup> edition

Lesson Plan Math 208 - Prepared by Jyoti Upadhyaya

Sr. No.	Lecture hours	Topics to be covered
1	2	Introduction, Descriptive, Inferential Statistics, Questionnaire, Mean, variance
2	2	Median, mode, quartiles, box plots, frequency curves, coefficient of variation.
3	2	Skewness, Kurtosis, probability introduced
4	2	Probability distribution, Random Variable, Cumulative Distribution, Discrete case
5	2	Cumulative distribution continuous case, Chebyshev's inequality
6	2	Binomial and Poisson Distribution
7	2	Cumulative Distribution Function continuous case
8	2	Conditional probability and expectation, discrete and continuous
9	2	Exercises on Cumulative Distribution Function, probability density function, expectation and variance
10	2	Exercises on Cumulative Distribution Function, probability density function, expectation and variance
11	2	Exercises on Cumulative Distribution Function, probability density function, expectation and variance
12	2	Normal distribution
13	2	Application of normal distribution in solving engineering problems.
14	2	Testing of hypothesis, null hypothesis, alternative hypothesis, level of significance
15	2	Test for single mean and single variance
16	2	Test for two means and two variances
17	2	Chi square test of goodness of fit, fitting a Poisson distribution
18	2	Confidence interval single mean and variance
19	2	Confidence interval two mean and two variance
20	2	Estimation of sample size and maximum error
21	2	Correlation and regression, normal equations, method of least squares
22	2	Hypothesis testing regression coefficients
23	2	Statistical quality control, p chart, u chart,
24	2	X bar chart, R chart
Total	48	



**Subject:-** Discrete Mathematics

**Course:-** MCSC 201

**Level:-** C.E (II Year/I Sem)

**Credit:-** 3

**Course Description:** *The course attempts to provide discrete methods that stress in many problems and structures of computer engineering. The course includes concepts of Logic, Relations and diagraph, Graph theory and Algebraic structure.*

**Course Objectives:** *Broadly, the following are the objectives of this course*

- (i) *Development of conceptual ideas on the topics.*
- (ii) *Imparting problem solving skills.*

**Evaluation Scheme:**

- **Continous in-Semester Evaluation:** 25 marks
  - (a) Internal Exam : 25 marks
- **End Semester Evaluation:** 75 marks
  - (a) Objective 20 marks (10 marks fill in the blank and 10 marks for multiple choices)
  - (b) Subjective 55 marks (Long answer questions 3 Q.  $\times 7 = 21$  marks; Short answer questions 6 Q.  $\times 4 = 24$  marks; Very short answer questions 5 Q  $\times 2 = 10$ )

### **1. Fundamentals [5]**

Algebra on Sets, Sequences, Integers and divisibility, Boolean Matrices; Mathematical structures

### **2. Logic [8]**

Propositions and Logical Operations, Conditional Statements, Methods of Proof, Mathematical induction, Pigeonhole Principle

### **3. Relations and Diagraphs [8]**

Product Sets and Partitions, Relations and Diagraphs, Paths in Relations and Diagraphs, Properties of Relations, Equivalence Relations, Operations on Relations

### **4. Functions [4]**

Introduction of Functions, Functions for Computer Science, Permutation Functions

### **5. Order Relations and Structures [6]**

Partially Ordered Sets, Extremal Elements of Partially Ordered Sets, Lattices, Finite Boolean Algebras

### **6. Graph Theory [9]**

Introduction of Graphs, Subgraphs and Quotient graphs, Euler Paths and circuits, Hamiltonian paths and circuits, Transport Networks.

### **7. Semigroups and Groups [8]**

Binary Operations, Semigroups, Product and Quotients of Semigroup, Groups, Products and Quotients of Groups, Other Mathematical Structures

**Text Book:** B. Kolman, R. C. Busby and S. C. Ross, Discrete Mathematical Structure, 6<sup>th</sup> Edition, PHI, New Delhi.

### **References:**

1. K. Rossen, Discrete Mathematics and Its Applications, 7<sup>th</sup> Edition, Tata McGrawHill, New Delhi.
2. R. P. Grimaldi, Discrete and Combinatorial Mathematics, Pearson Education