Course Code	Course Title	L	P	U
MA212	**Probability and Statistics**	**3**	**0**	**3**

Course Objectives:

1. To equip the students with the elements of probability and probability distributions.
2. To understand some fundamental principles and knowledge of statistics.
3. Applications of probability and statistical techniques are emphasized to solve practical problems in science and engineering.

Course Outcomes:

Upon successful completion, a student will be able to:

1. Recognize the role of and application of probability theory, descriptive and inferential statistics in many different fields,
2. Recognize common probability distributions for discrete and continuous variables;
3. Apply methods from algebra and calculus to derive the mean and variance for a range of probability distributions;
4. Understand the concept of an estimator, common methods for evaluating an estimator's performance and properties of desirable estimators;

Course Contents:

Introduction to permutation and combination, sample space, events and counting. Probability of an event, additive rules, conditional probability, multiplicative rule, Bayes' theorem and application. Discrete, continuous and joint probability distribution function. Mean, variance, co-variance of random variables, mean and variance of linear combinations of random variables. Study of some standard discrete and continuous probability distributions. Population, sample, central tendency in sample and sample variance. Sampling distributions of means and some standard sampling distributions. Classical methods of estimation, point estimate, interval estimate, proportion estimate, general concepts of statistical hypothesis. Simple linear regression, least square estimator, correlation.

Textbook(s):

T1: Probability and Statistics for Engineers & Statistics, R. E. Walpole, R. H. Myers, S. L. Myers, K. Ye, Pearson Education, 7th Edition, 2006.

Reference book(s):

R1: Miller & Freund's Probability & Statistics for Engineers, R. A. Johnson, PHI, 7th Edition, 2008.

R2: Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Matt, A. Kandel and T. Baker, 2nd Edition, PHI, 2009.

Lecture-wise plan:

Lecture No.	Learning objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-4	Review of previous knowledge	Introduction to permutation and combination.	R2: Ch 2: 126-211
5	Understand and describe sample spaces and events for random experiments	Sample space, events and counting	T1: Ch 2: 38-47
6-9	To understand the basic concepts of probability and conditional probability	Probability of an event, additive rules, conditional probability, multiplicative rule, Bayes' theorem and application	T1: Ch 2: 55-73
10-14	Concepts of random variable and probability distribution functions	Discrete, continuous and joint probability distribution function	T1: Ch 3: 79-102
15-18	To have the concept of mathematical expectation	Mean, variance, co-variance of random variables, mean and variance of linear combinations of random variables	T1: Ch 4: 104-130
19-26	To find mean, variance from probability distribution function	Study of some standard discrete probability distributions	T1: Ch 5: 131-156
		Study of some standard continuous probability distributions	T1: Ch 6: 158-191
27-29	Review of statistical components	Population, sample, central tendency in sample and sample variance	T1: Ch 8: 210-223
30-32	To have the concepts of sampling distributions	Sampling distributions of means and some standard sampling distributions	T1: Ch 8: 224-244
33-37	Understand the concept of estimation and testing hypothesis	Classical methods of estimation, point estimate, interval estimate, proportion estimate, general concepts of statistical hypothesis	T1: Ch 9: 246-291 Ch 10: 300-320
38-40	To estimate the parameters in linear regression model	Simple linear regression, least square estimator, correlation	T1:Ch 11: 366-406

Evaluation Scheme:

Component	Duration	Weightage (%)	Remarks
Internal I	50 mins.	10	Closed Book
Mid term	2 hrs.	30	Closed Book
Internal II	50 mins.	10	Closed Book
Comprehensive Exam	3 hrs.	50	Closed Book

1. **Attendance Policy:** A Student must normally maintain a minimum of **75% attendance** in the course without which he/she shall be disqualified from appearing in the respective examination.

2. **Make-up Policy:** A student, who misses any component of evaluation for genuine reasons, must immediately approach the instructor with a request for make-up examination stating reasons. **The decision of the instructor in all matters of make-up shall be final.**

3. **Chamber Consultation Hours:** During the Chamber Consultation Hours, the students can consult the respective faculty in his/her chamber without prior appointment.