

22EE410	Probability Distribution & Random Process
----------------	--

Category	L	T	P	Credit
BSC	3	1	0	4

Preamble

An electrical engineering student needs to have some basic statistical tools and techniques to apply in diverse applications in digital signal processing communications systems and networks, radar systems, power systems that requires an understanding of Probability distributions, and Testing of Hypotheses and random process. The course is designed to impart the knowledge and understanding of the above concepts to Electrical Engineers and apply them in their areas of specialization.

Prerequisite

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

Cos	Course Outcomes	TCE Proficiency Scale	Expected Proficiency in %	Expected Attainment Level %
CO1	Use standard distributions to find the expected life time of electrical components.	TPS3	75	70
CO2	Apply the concept of Joint Probability Distributions and random samples	TPS3	75	70
CO3	Apply the concept of testing the hypotheses for single samples by using various tests for difference of proportions and means.	TPS3	75	70
CO4	Apply the concept of testing the hypotheses for two samples by using various tests for difference of proportions and means.	TPS3	75	70
CO5	Estimate the statistical measures of random processes.	TPS3	70	65
CO6	Estimate the power spectral density of random processes.	TPS3	70	65

Mapping with Programme Outcomes

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	S	M	L	L	-	-	-	M	M	M	-	M	S	S

CO2	S	M	L	L	-	-	-	M	M	M	-	M	S	S
CO3	S	M	L	L	-	-	-	M	M	M	-	M	S	S
CO4	S	M	L	L	-	-	-	M	M	M	-	M	S	S
CO5	S	M	L	L	-	-	-	M	M	M	-	M	S	S
CO6	S	M	L	L	-	-	-	M	M	M	-	M	S	S

S- Strong; M-Medium; L-Low

Assessment Pattern

CO	Assessment 1						Assessment 2						Terminal(%)		
	Written Test 1			Assignment 1			Written Test 2			Assignment 2					
TPS	R	U	A	R	U	A	R	U	A	R	U	A	R	U	A
CO1	33%			100%									16%		
CO2	42%												21%		
CO3	25%						8%			100%			17%		
CO4							38%						19%		
CO5							33%						17%		
CO6							21%						10%		
TOTAL													100%		

*Terminal examination should cover all Course Outcomes in the appropriate TPS Scale level.

Syllabus

Probability Distributions: Random Variables – Discrete Probability distribution: Binomial Distribution - Poisson distribution – Continuous Probability distribution: Normal and Exponential Distributions.

Joint Probability Distributions: Jointly distributed Random Variables – Two Discrete Random Variables -Two Continuous Random Variables –Independent Random Variables –Conditional Distributions – Expected Values, Covariance and Correlation: Covariance – Correlation.

Tests of Hypothesis Based on a Single Sample: Hypotheses and Test Procedures – z-Tests for Hypotheses about a Population Mean – The One Sample t test – Test Concerning a Population Proportion.

Inferences Based on Two Samples: zTests and Confidence Intervals for a Difference between Two Population Means – The Two Sample t-test and Confidence Interval – Inferences Concerning a Difference Between Population Proportions – Chi-square Tests - Goodness of Fit –Two Way Contingency Tables.

Random Processes: Introduction – Classification of Random Process – Characterizing a Random Process – Cross Correlation and Cross Covariance of Functions – Stationary Random Processes – Power Spectral Density.

Text Books

1. Jay L. Devore, Probability and Statistics for Engineering and the Sciences, 9th Edition, Cengage Learning India Pvt Ltd, New Delhi, 2014.
2. Oliver C. Ibe, Fundamentals of Applied Probability and Random Processes, Elsevier, 2015.

Reference Books

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, "Probability & Statistics for Engineers & Scientists", Pearson, New Delhi, 2016.
2. Richard A. Johnson, "Miller & Freund's, Probability and Statistics for Engineers", Prentice Hall, New Delhi, 2017.
3. John Bird, "Higher Engineering Mathematics", Fifth edition, Published by Elsevier Ltd., 2006.
4. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", Wiley India, New Delhi, 2018.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Periods
1	Probability Distributions	
1.1	Random Variables	1
1.2	Discrete Probability distribution: Binomial Distribution	1
1.3	Poisson Distribution	1
	Tutorial	1
1.4	Continuous Probability distribution: Normal Distributions	2
1.5	Exponential Distributions	1

Module No.	Topic	No. of Periods
	Tutorial	1
2	Joint Probability Distributions	
2.1	Jointly distributed Random Variables – Two Discrete Random Variables	2
2.2	Two Continuous Random Variables - Independent Random Variables	1
	Tutorial	1
2.3	Conditional Distributions	2
2.4	Expected Values, Covariance	1
	Tutorial	1
2.5	Correlation	2
3	Tests of Hypothesis Based on a Single Sample	
3.1	Hypotheses and Test Procedures	1
3.2	z-Tests for Hypotheses about a Population Mean	2
	Tutorial	1
3.3	The One Sample t test	2
3.4	Test Concerning a Population Proportion.	1
	Tutorial	1
4	Inferences Based on Two Samples	
4.1	Z Tests and Confidence Intervals for a Difference between Two Population Means	2
4.2	The Two Sample t-test and Confidence Interval	1
	Tutorial	1
4.3	Inferences Concerning a Difference Between Population Proportions	2
4.4	Chi-square Tests - Goodness of Fit	1
	Tutorial	1
4.5	Two Way Contingency Tables.	1
5	Random Processes	
5.1	Introduction	1

Module No.	Topic	No. of Periods
5.2	Classification of Random Process	2
	Tutorial	1
5.3	Characterizing a Random Process	1
5.4	Cross Correlation and Cross Covariance of Functions	2
	Tutorial	1
5.5	Stationary Random Processes	2
5.6	Power Spectral Density.	2
	Tutorial	1
	Total	48

Course Designer(s):

1. Dr. R. Rammohan, Professor, Mathematics, rr_maths@tce.edu
2. Dr.L.Muthusubramanian, Assistant Professor, lmsmat@tce.edu
Mathematics,
3. Dr. S. Suriyakala, Assistant Professor, Mathematics, ssamat@tce.edu