

## PROBABILITY AND STATISTICS

<b>II Semester: CSE/IT</b>																																												
Course Code	Category	Hours / Week			Credits	Maximum Marks																																						
AHSB12	Foundation	L	T	P	C	CIA	SEE	Total																																				
		3	1	-	4	30	70	100																																				
<b>Contact Classes: 45</b>		<b>Tutorial Classes: 15</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>																																					
<p><b>COURSE OBJECTIVES:</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>I. Enrich the knowledge of probability on single random variables and probability distributions.</li> <li>II. Apply the concept of correlation and regression to find covariance.</li> <li>III. Analyze the given data for appropriate test of hypothesis.</li> <li>IV. Understand the foundations for classical inference involving confidence intervals and hypothesis testing.</li> </ol> <p><b>COURSE OUTCOMES (COs):</b></p> <p>CO 1: Discuss the concepts of probability, conditional probability, Baye’s theorem and random variables            CO 2: Classify the probability distributions and study their properties            CO 3: Understand the concepts of correlation and regression to the given data.            CO 4: Apply testing of Hypothesis for sample means and sample proportions.            CO 5: Estimate the truth value of the statistical hypotheses by using small sample tests.</p> <p><b>COURSE LEARNING OUTCOMES (CLOs):</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">AHSB12.01</td><td>Describe the basic concepts of probability.</td></tr> <tr><td>AHSB12.02</td><td>Summarize the concept of conditional probability and estimate the probability of event using Baye’s theorem.</td></tr> <tr><td>AHSB12.03</td><td>Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.</td></tr> <tr><td>AHSB12.04</td><td>Use the concept of random variables in real-time problem like graph theory, machine learning.</td></tr> <tr><td>AHSB12.05</td><td>Determine the binomial distribution to find mean and variance.</td></tr> <tr><td>AHSB12.06</td><td>Understand the phenomena of real-time problem like sick versus healthy by using Binomial distribution.</td></tr> <tr><td>AHSB12.07</td><td>Determine the Poisson distribution to find mean and variance.</td></tr> <tr><td>AHSB12.08</td><td>Understand the phenomena of real-time problem of predicting soccer scores by using Poisson distribution.</td></tr> <tr><td>AHSB12.09</td><td>Illustrate the inferential methods relating to the means of normal distributions.</td></tr> <tr><td>AHSB12.10</td><td>Describe the mapping of normal distribution in real-world problem to analyze the stock market.</td></tr> <tr><td>AHSB12.11</td><td>Demonstrate the concept of correlation for a Bivariate data .</td></tr> <tr><td>AHSB12.12</td><td>Calculate the Karl Pearson’s correlation coefficient for the given data</td></tr> <tr><td>AHSB12.13</td><td>Calculate the Spearman’s rank correlation coefficient for the given data.</td></tr> <tr><td>AHSB12.14</td><td>Estimate the linear regression for the given data</td></tr> <tr><td>AHSB12.15</td><td>Understand the phenomena of real-time problem like stock price and interest rates by using the concepts of correlation and regression.</td></tr> <tr><td>AHSB12.16</td><td>Understand the fundamentals of hypothesis testing.</td></tr> <tr><td>AHSB12.17</td><td>Calculate the value of test statistic for the data related to single mean and single proportion.</td></tr> <tr><td>AHSB12.18</td><td>Calculate the value of test statistic for the data related to difference of means.</td></tr> </table>									AHSB12.01	Describe the basic concepts of probability.	AHSB12.02	Summarize the concept of conditional probability and estimate the probability of event using Baye’s theorem.	AHSB12.03	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.	AHSB12.04	Use the concept of random variables in real-time problem like graph theory, machine learning.	AHSB12.05	Determine the binomial distribution to find mean and variance.	AHSB12.06	Understand the phenomena of real-time problem like sick versus healthy by using Binomial distribution.	AHSB12.07	Determine the Poisson distribution to find mean and variance.	AHSB12.08	Understand the phenomena of real-time problem of predicting soccer scores by using Poisson distribution.	AHSB12.09	Illustrate the inferential methods relating to the means of normal distributions.	AHSB12.10	Describe the mapping of normal distribution in real-world problem to analyze the stock market.	AHSB12.11	Demonstrate the concept of correlation for a Bivariate data .	AHSB12.12	Calculate the Karl Pearson’s correlation coefficient for the given data	AHSB12.13	Calculate the Spearman’s rank correlation coefficient for the given data.	AHSB12.14	Estimate the linear regression for the given data	AHSB12.15	Understand the phenomena of real-time problem like stock price and interest rates by using the concepts of correlation and regression.	AHSB12.16	Understand the fundamentals of hypothesis testing.	AHSB12.17	Calculate the value of test statistic for the data related to single mean and single proportion.	AHSB12.18	Calculate the value of test statistic for the data related to difference of means.
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AHSB12.19	Calculate the value of test statistic for the data related to difference of proportions.	
AHSB12.20	Summarize the concept of hypothesis testing to select the best means to stop the hazardous problems like smoking.	
AHSB12.21	Use Student t-test to predict the difference in sample means.	
AHSB12.22	Apply F-test to predict the difference in sample variances.	
AHSB12.23	Understand the characteristics between the samples using Chi-square test.	
<b>MODULE-I</b>	<b>PROBABILITY AND RANDOM VARIABLES</b>	<b>Classes: 09</b>
Probability, Conditional Probability, Baye's Theorem; Random variables: Basic definitions, discrete and continuous random variables; Probability distribution: Probability mass function and probability density functions; Mathematical expectation.		
<b>MODULE -II</b>	<b>PROBABILITY DISTRIBUTION</b>	<b>Classes: 09</b>
Binomial distribution; Mean and variances of Binomial distribution, Recurrence formula for the Binomial distribution; Poisson distribution: Poisson distribution as a limiting case of Binomial distribution, mean and variance of Poisson distribution, Recurrence formula for the Poisson distribution; Normal distribution; Mean, Variance, Mode, Median, Characteristics of normal distribution.		
<b>MODULE-III</b>	<b>CORRELATIONS AND REGRESSION</b>	<b>Classes: 09</b>
Correlation: Karle Pearson's Coefficient of correlation, Computation of correlation coefficient, Rank correlation, Repeated Ranks; Properties of correlation.		
Regression: Lines of regression, Regression coefficient, Properties of Regression coefficient, Angle between two lines of regression; Multiple correlation and Regression.		
<b>MODULE-IV</b>	<b>TEST OF HYPOTHESIS - I</b>	<b>Classes: 09</b>
Sampling: Definitions of population, Sampling, Parameter of statistics, standard error; Test of significance: Null hypothesis, alternate hypothesis, type I and type II errors, critical region, confidence interval, level of significance. One sided test, two sided test.		
Large sample test: Test of significance for single mean, Test of significance for difference between two sample means, Tests of significance single proportion and Test of difference between proportions.		
<b>MODULE-V</b>	<b>TEST OF HYPOTHESIS - II</b>	<b>Classes: 09</b>
Small sample tests: Student t-distribution, its properties: Test of significance difference between sample mean and population mean; difference between means of two small samples. Snedecor's F-distribution and its properties; Test of equality of two population variances Chi-square distribution and it's properties; Test of equality of two population variances Chi-square distribution, it's properties, Chi-square test of goodness of fit.		
<b>Text Books:</b>		
1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 9 <sup>th</sup> Edition, 2014.		
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42 <sup>nd</sup> Edition, 2012.		
<b>Reference Books:</b>		
1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand & Co., 10 <sup>th</sup> Edition, 2000.		
2. N. P. Bali, "Engineering Mathematics", Laxmi Publications, 9 <sup>th</sup> Edition, 2016.		

3. Richard Arnold Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Prentice Hall, 8<sup>th</sup> Edition, 2013.

**Web References:**

1. [http://www.efunda.com/math/math\\_home/math.cfm](http://www.efunda.com/math/math_home/math.cfm)
2. <http://www.ocw.mit.edu/resources/#Mathematics>
3. <http://www.sosmath.com>
4. <http://www.mathworld.wolfram.com>

**E-Text Books:**

1. <http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html>
2. <http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks>