PROBABILITY AND STATISTICS

II Semester: CSE / IT								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AHS010	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

OBJECTIVES:
The course should enable the students to:
I.   Enrich the knowledge of probability on single random variables and probability distributions.
II. Apply the concept of correlation and regression to find covariance.
III. Analyze the given data for appropriate test of hypothesis.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the basic concepts of probability and random variables.
2. Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.
3. Use the concept of random variables in real-world problem like graph theory, machine learning, Natural language processing.
4. Apply the binomial distribution and poisson distribution to find mean and variance.
5. Understand binomial distribution to the phenomena of real-world problem like sick versus healthy.
6. Use poission distribution in real-world problem to predict soccer scores.
7. Apply the inferential methods relating to the means of normal distributions.
8. Understand the mapping of normal distribution in real-world problem to analyze the stock market.
9. Explain multiple random variables and the covariance of two random variables.
10. Understand the concept of multiple random variables in real-world problems aspects of wireless communication system.
11. Calculate the correlation coefficient to the given data.
12. Understand the correlation and regression to the real-world such as stock price and interest rates.
13. Calculate the regression to the given data.
14. Understand the concept of sampling distribution of statistics and in particular describe the behavior of the sample mean.
15. Understand the concept of estimation for classical inference involving confidence interval.
16. Understand the concept of estimation in real-world problems of signal processing.
17. Understand the foundation for hypothesis testing.
18. Understand the concept of hypothesis testing in real-world problem to selecting the best means to stop smoking.
19. Apply testing of hypothesis to predict the significance difference in the sample means.
20. Apply testing of hypothesis to predict the significance difference in the sample proportions.
21. Apply Student t-test to predict the difference in sample means.
22. Apply F-test to predict the difference in sample variances.
23. Understand the characteristics between the samples using Chi-square test.
24. Understand the assumptions involved in the use of ANOVA technique.
25. Understand the concept ANOVA to the real-world problems to measure the atmospheric tides.

Unit-I	SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTION	Classes: 09

Random variables: Basic definitions, discrete and continuous random variables; Probability distribution: Probability mass function and probability density functions; Mathematical expectation; Binomial distribution, Poisson distribution and normal distribution.

Unit -II	MULTIPLE RANDOM VARIABLES	Classes: 09

Joint probability distributions, joint probability mass, density function, marginal probability mass, density functions; Correlation: Coefficient of correlation, the rank correlation; Regression: Regression coefficient, the lines of regression, multiple correlation and regression.

Unit -III	SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS	Classes: 09

Sampling: Definitions of population, sampling, statistic, parameter; Types of sampling, expected values of sample mean and variance, sampling distribution, standard error, sampling distribution of means and sampling distribution of variance.

Estimation: Point estimation, interval estimations; Testing of hypothesis: Null hypothesis, alternate hypothesis, type I and type II errors, critical region, confidence interval, level of significance. One sided test, two sided test.

Unit -IV	LARGE SAMPLE TESTS	Classes: 09

Test of hypothesis for single mean and significance difference between two sample means, Tests of significance difference between sample proportion and population proportion and difference between two sample proportions.

Unit -V	SMALL SAMPLE TESTS AND ANOVA	Classes: 09

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; ANOVA: Analysis of variance, one way classification, two way classification.

Text Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 9th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.

Reference Books:

1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand & Co., 10th Edition, 2000.
2. N. P. Bali, "Engineering Mathematics", Laxmi Publications, 9th Edition, 2016.
3. Richard Arnold Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Prentice Hall, 8th Edition, 2013.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.ocw.mit.edu/resourcs/#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