



## Mathematical Statistics

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
STA	211	Mathematical Statistics	4	3	0	2	MAT 102, STA 111

### *Objectives:*

- To teach students some important scientific concepts of statistics.
- To let students be familiar with distributions of random vectors.
- To expose students to concepts of Expectation and moments.
- To let students know sampling distributions and CLT of their applications.
- To teach students techniques of estimations.
- To let students learn and use some tests of hypothesis.

### *Syllabus:*

- **Bivariate Probability Distribution:** Two Discrete Random Variables, Two Continuous Random Variables, Covariance and Correlation, Bivariate Normal Distribution, Linear Combinations of Random Variables.
- **Sampling distributions and the central limit theorem:** Sampling Distributions, Sampling Distributions of the Means, Sampling Distribution of  $S^2$ - Chi-Squared distribution,  $t$ -Distribution,  $F$ -Distribution.
- **Functions of Random Variables:** Finding the probability distribution of a function of random variable, The method of distribution function, The method of transformations, Using the Moment-Generating Functions.
- **Parameter Estimations:** Point estimation: properties of estimators, the method Maximum Likelihood Estimators, the method of moments, precision of estimation: the standard error, Single – Sample Confidence Interval Estimation, Two sample Confidence interval Estimation.
- **Hypothesis testing:** General Concepts, Testing a Statistical Hypothesis, Single and Two Samples testing.

### *References:*

- **Probability & Statistics for Engineers & Scientists**, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Pearson Prentice Hall, 9<sup>th</sup> Edition, 2012.
- **Applied Statistics and Probability for Engineers**, 5<sup>th</sup> Edition, by Douglas C. Montgomery, George C. Runger, John Wiley & Sons, Inc., 2010.
- **Probability and Statistics for Engineering and the Sciences**, Jay L. Devore, Duxbury 2004.
- **Introduction to Mathematical Statistics**, R. Hogg, et al, Prentice Hall, 2004.

