



## Probability and Statistics for Engineers

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	215	Probability and Statistics for Engineers	3	2	0	2	MAT 105

### *Syllabus:*

**The Role of Statistics in Engineering:** The Engineering method and statistical thinking: Collecting engineering, (basic principles, Retrospective study, Observational study and designed experiments); Mechanistic and empirical models, Probability and probability Models.

**Probability:** Sample spaces and Events (Random experiments, random spaces, events); counting techniques: Interpretations of probability (axioms of probability), additions rules; Conditional probability (Multiplication rule, total probability rule, independence, Bayes' theorem); Random variables.

**Discrete Random Variables and Probability Distributions:** Probability distributions and probability mass functions, cumulative distribution functions; Mean and variance of discrete random variables.

**Continuous Random Variables and Probability Distributions:** Probability distributions and probability density functions, cumulative; distribution functions; Mean and variance of a continuous random variables; Normal distribution and normal approximation to the binomial and Poisson distributions; Examples of continuous distributions (exponential distribution, gamma distribution, Erlang distribution, Weibull distribution, lognormal distribution)

**Joint Probability Distributions:** Joint Probability distributions, Marginal probability distributions; Two discrete random variables, conditional probability distributions, independence; Linear combinations of random variables.

**Random Sampling and Data Description:** Data summary and display; Random sampling Stem and leaf diagrams, Frequency distributions and histograms, box plots, time sequence plots, probability plots.

**Point Estimation of Parameters:** General concepts of point estimation (Unbiased estimator, Variance of point estimator, mean square error of an estimator); Method of moments of point estimator; Method of maximum likelihood.

**Tests of hypotheses:** Hypotheses testing; statistical hypotheses, tests of statistical hypotheses, general procedure for hypotheses tests.

### *References:*

1. Probability & Statistics for Engineers & Scientists, 8<sup>th</sup> Edition, Ronald Walpole, Raymond Myers, Sharon Myers, Keying Ye, Person Education International. (**Main Reference**)
2. Probability and Statistics in Engineering, 4<sup>th</sup> Edition, William W. Hines, Douglas C. Montgomery, David M. Goldsman, Connie M. Borror, John Wiley & Sons Inc, 2003.
3. Introduction to Probability and Statistics, 13<sup>th</sup> Edition, William Mendenhall, Robert J. Beaver, Barbara M. Beaver, Duxbury Press, 2009.
4. Schaum's Outline of Introduction to Probability and Statistics, 2<sup>nd</sup> Edition, Seymour Lipschutz and Jack Schiller, McGraw Hill International Editions (Schaum's Outline Series) 1998.
5. Data Analysis With Microsoft Excel, 3<sup>rd</sup> Edition, Kenneth N. Berk, Patrick Carey; Duxbury Press, 2010.

