統計**(Statistics)**

Overview and Goal:
This course introduces the students to the theory of statistics. The course covers the following subjects: probability space, independence, conditional probability, random variables, mathematical expectations, probability density functions, multivariate, accumulated distribution functions. We will also lecture confidence intervals, statistical hypotheses testing, CRB, special distributions, sufficient statistics and Maximum likelihood approach. This course aims to build a solid foundation for engineering students to apply statistical tools and theory for engineering applications.

Text Books:
Robert V. Hogg, Joeseph McKean, Allen T Craig, Introduction to Mathematical Statistics, Pearson , 7^{th} Edition (2012).

Grading:
1. Home work: 10%
2. Midterms: 40%
3. Final: 50%

Scheduled Topics:
Discrete Random Variables and its order statistics
Continuous Random Variables and its order statistics
Transformations of Random Variables
Distributions of two random variables and its transformations
Correlation coefficient, covariances, and extension to multivariate RVs
Special distributions, Binomial, Poisson
Gamma, Chi square and Beta distributions, t-Distributions and Mixture Distributions
Statistical Inference, Sampling, Histogram, Estimate of pmf and pdf
Order Statistics
Introduction to Hypothesis testing
ChiSquare test and Monte Carlo method
Maximum Likelihood Method
Cramer-Rao Bound
Sufficient Statistics, The Exponential class of distributions