

Course title : Probability and Statistics

Format : 3 lecture hours, 1 tutorial hour

Prerequisites: none

Course program:

- Events: sources of random events, the probability theory as a mathematical model for random events, statistical modeling and statistical inference.
- Theoretical statistics: population and sample, data organization, random variables and their types, data representation by means of a table and histogram graph, data processing, frequency. Measurements of central tendencies and dispersion.
- Groups and combinatorics: the group concept, group relations and operations, ordered and unordered samples, basic combinatorics formulae.
- Types of events: a random experiment as a source of random events. Event algebra, complete group of events. Dependent and independent events, exclusive and inclusive events.
- Probability: probability spaces, definition of probability, probability calculation by means of combinatorics, the probability axiom and fundamental laws, conditional probability, product probability formula, Bayes's formula, total probability.
- Discrete random variables: one and two-dimensional variables, special one dimensional distributions, geometric binomial distribution, Poisson, hypergeometric distribution. Random variable moments: expectancy, variance and its properties, asymmetric parameter, variance of the sum of random variables, correlation factor, covariance, linear regression.
- Continuous random variable: probability density, cumulative distribution function, moments, expectation, variance. The normal distribution. One dimensional and two-dimensional random variables.
- Limit theorems and the law of large numbers: the weak law of large numbers, central limit theory, the law of large numbers, normal approximation to the binomial distribution.
- Approximation, confidence interval, residuals test, chi-square test.

Bibliography:

Textbook:

1. R.E. Walpole and R.H. Myers: "Probability and Statistics for Engineers and Scientists", Collier Macmillan, (1993).

Supplementary reading:

1. P.T. Strain: "Probability and Statistics with Applications", Harcourt Brace Jovanovich, (1991)
2. A. Liberman: "Introduction to Probability Theory", Shaum, (1980).
3. R. Eisenbach: "Statistics for Non-statisticians", Akdamon (1991).