COMPULSORY

Applied Probability - Estimation – 24 hours
Probability theory principles are presented, distributions and their measures as well as basic statistical theory including parameter estimation.

Hypothesis Testing – Linear Models – 24 hours
Confidence intervals, hypothesis testing theory, principals of linear regression, of analysis of variance and its applications are presented.

Statistical Applications using R – 24 hours
This course aims at introducing students to the R language, programming with R, empirical applications of estimation, statistical inference and linear models using R.

Data Analysis – 24 hours
Statistical applications of Linear Regression, analysis of variance. Contemporary statistical applications in big data using R.

Optimization Techniques – 24 hours
Introduction to optimization techniques, such as Gradient descent and Newton-Raphson algorithms, Simplex method, inline, convex and dynamic programming, as well as local search methods and genetic algorithms.

Generalized Linear Models – 24 hours
The principles of statistical modeling, experimental design and use of the exponential distributions are presented. The course presents the use of R language in modeling binary or binomial data, Poisson data, categorical and ordinal data.

Time Series Analysis and Forecasting using R – 24 hours
This course aims at introducing students to time series, in deterministic models and predictions, in stochastic models (ARMA) and Box Jenkins methodology in predicting heteroscedasticity models with applications via Eviews or R.

Medical Statistics – 24 hours
Basic principles of Epidemiology, morbidity and risk measures, diagnostic principles, case control studies, randomized and non-randomized experiments.

Computational Statistics using R – 24 hours
This course deals with the use of advanced computational techniques for statistical inference in a series of problems. It includes issues of random variables simulation, Monte Carlo and bootstrap inference and other computational techniques necessary to solve modern problems. R language will be used in all applications.

OPTIONAL COURSES

Applied Bayesian Statistics – 24 hours

Basic principles of Bayesian statistics are presented, the a-priori distribution, estimating the posterior distribution, Bayesian modeling (linear models, generalized linear models, and hierarchical models) as well as the MCMC algorithm for estimating the posterior distribution, using WinBUGS and/ or R.

Statistical Learning – 24 hours
This course is about extracting information from data using statistical models. It includes a variety of methods for data clustering, observation classification as well as the necessary theoretical background to be able to evaluate the process and the extracted information.

Survival Analysis – 24 hours
Basic principles of survival functions, parametric and non parametric modeling of survival data and its applications.

Stochastic Dynamic Programming – 24 hours
In this couurse, the dynamic programming algorithm is taught for finite time optimization problems, applications to optimal maintenance-replacement-routing problems. Also taught are the policies improvement algorithm and the Successive Approach for Infinite Term Problems.

Δειγματοληψία (Sampling) – 24 hours
Basic sampling theory in finite populations, using auxiliary information in estimations, estimating small areas, variance estimation in complex surveys and a wide range of sampling issues.

Quality Control and Reliability – 24 hours
Principles of statistical quality control and reliability, including the six sigma methodology, control charts characteristics, EWMA and CUSUM control chart and their extensions in correlated or multivariate data.

Demography – 24 hours
Demographic measures, methods for analyzing mortality, survival tables, techniques for normalization of empirical data as well as parametric or non-parametric modeling of demographic data.

Highdimensional Statistics– 24 hours
This course deals with statistical methods for analyzing data of large volumes and/ or dimensions. In the lectures there are also presented the alterations of known methods to address such problems but also methods for data that are unstructured such as network data, problems such as multiplicity, regression for large scale data, regularization, and other contemporary techniques.

Clinical Trials – 24 hours
Types of clinical trials are presented, its design, randomization and size assessment techniques, analysis and repeated measures analysis.

Decision Analysis and Game Theory – 24 hours
The decision analysis is presented, utility theory and applications in portfolios, introduction to game theory, games of complete and incomplete information, in extended and regular form. Solutions, Nash solutions and applications in industrial management.

Inventory Theory and Supply Chain Management – 24 hours
In this course, deterministic and stochastic stock systems are analyzed with continuous and periodic stock monitoring. We analyze ways to find optimal stock policy when inventory demand is stable or random. Models of optimal supply chain management are examined.

Financial Mathematics with Applications in MATLAB and PYTHON – 24 hours
Introduction to the basic concepts of financial mathematics, presentation of contemporary quantitative theories, techniques and tools, decision theory under uncertainty, introduction to the operation and structure of markets and the nature of financial instruments, pricing models, derivative contracts, bonds, portfolio theory, introduction to risk management.