

## COURSES CONTENT – MINIMUM TEACHING HOURS

### A' semester – COMPULSORY

#### **Probability and Statistical Inference – 36 hours**

Basic probability distributions, introduction to stochastic processes, probability, sufficiency, hypothesis testing, statistical theory and applications.

#### **Computational Statistics – 36 hours**

Databases, designing and managing with appropriate and up-to-date tools and ideas from the Business intelligence, R applications and other modern data visualization techniques.

#### **Generalized Linear Models – 36 hours**

Generalized Linear Models theory, use in statistical modeling and in categorical data analysis. Extension to correlated data, mixed effects and GLMM models.

#### **Data Analysis – 36 hours**

Statistical applications in Linear Regression, in analysis of variance, contemporary statistical applications in big data using R.

### B' semester – OPTIONAL

#### ***A) Applied Statistics***

##### **Biostatistics – 18 hours**

Basic principles of survival functions, parametric and non parametric survival data modeling and its applications.

##### **Epidemic Models - 18 hours**

Basic understanding of disease transmission and the relevant factors which affect it. Disease control techniques and parameter estimation will be possible, including the estimation of the relevant function(s) such as the disease reproductive rate and the vaccination coverage.

##### **Advanced Methods in Survey Sampling – 18 hours**

Basic sampling theory in finite populations, subpopulation parameter estimation, using auxiliary information in parameter estimation, variance estimation in surveys with a complex sample design and non response estimation techniques and imputation techniques.

##### **Statistical Quality Control - 18 hours**

##### **Topics in Applied Statistics – 18 hours**

#### ***B) Computational Statistics***

##### **Bayesian Statistics – 18 hours**

The basic principles of Bayesian Statistical and its applications are presented

##### **Statistical Learning – 18 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.

**Statistics for Big Data – 18 hours**

The course deals with the differentiations, challenges and alterations of known statistical methods in modern problems with a large amount of data but also with unstructured data. The lectures present these changes as well as methods for network data, problems such as multiplicity, regression for large-scale data, regularization and other contemporary techniques.

**Advanced Stochastic Processes – 18 hours**

Principles of stochastic processes are presented. Among those introduced are martingales in discrete and continuous time, the Markov property, Poisson processes, the Brown movement, Ito's stochastic integral and its properties. Finally, the basic theory of stochastic differential equations is presented.

**Topics in Computational Statistic – 18 hours*****f) Stochastics*****Probability Theory – 18 hours**

The general framework of Probability theory is presented, emphasizing on the kinds of stochastic convergence, corresponding limit theorems and the general form of probability measures in the actual Borel conjecture.

**Time Series Analysis – 18 hours**

Basic theory of time series analysis, AR, MA, ARMA models as well as parametric and non parametric decomposition of time series components and its applications.

**Stochastic Models in Finance – 18 hours**

This course introduces the theory of some important stochastic models in finance, like the Black-Scholes model, as well as other models for pricing financial products. It also introduces the necessary theory of stochastic differential equations for researching these models.

**Financial Econometrics – 18 hours****Topics in Stochastics – 18 hours**