PhD in Statistics - Bocconi University

**STATISTICAL THEORY II**
A.Y. 2018-19
(Eugenio Melilli)

**Course Topics**

- Statistical decision problem, action space, randomized strategies, image of a strategy, loss and risk functions, optimality, the role of sufficiency, unbiasedness and invariance as sub-optimality criteria in a general decision problem.
- Hypotheses testing as statistical decision problem: critical function, power function, optimality criterion, Neyman-Pearson Lemma and its consequences.
- Sub-optimality criteria: invariance, similarity and unbiasedness.
- Likelihood ratio test. Linear hypothesis, the F test and its properties.
- Families of confidence regions.
- Basic elements of large sample theory: consistency of estimators, asymptotic distributions of statistics, asymptotic normality, Cramer theorem. Edgeworth expansions as a tool to compare procedures based on asymptotic normality.
- Asymptotic properties of procedures based on the likelihood.
- Basic elements of nonparametric statistics: empirical distribution and empirical process, empirical quantiles and quantile process, examples of statistical procedures based on the empirical distribution.

**Textbooks**


Additional references will be provided during the course.

**Exam (joint with Statistical Theory I)**

Written exam.

Oral presentation of a topic chosen by the student.