**Mathematical Statistics — Marcelo Fernandes & Renato Galvão Flôres Jr.**

Fundamental concepts of statistical inference

- Statistical model, decision space and loss function
- Optimal decision rules: pure and randomized
- Statistical principles: equivariance, invariance and unbiasedness

Sufficient statistics

- Dominated family: Radon-Nikodyn theorem and Halmos-Savage lemma
- Conditional expectation and probability: Halmos-Savage theorem and properties
- Neyman-Pearson factorization criterion
- Minimal sufficient statistics

Exponential model

- Privileged statistic and minimal sufficiency
- Random sampling of exponential models
- Moments of privileged statistics

Distribution free and complete statistics

- Ancillarity principle, complete and disconnected statistics
- Basu’s theorem and Fisher’s lemma

Point estimation

- Rao-Blackwell theorem and Lehmann-Scheffé theorem: UMRU estimators
- Invariance and the principle of equivariance: UMRE estimators
- Invariants e maximal invariants: Pitman estimators

Hypothesis testing

- Neyman’s principle: UMP tests and the Neyman-Pearson theorem
- Least favorable distribution, (L)UMPU tests and nuisance parameters

**References**

Gourieroux, C. and A. Monfort (1995) *Statistics and Econometric Models*, Volume I, Cambridge University Press.

Lehmann, E. L. (1997) *Testing Statistical Hypothesis*, Springer-Verlag.

Lehmann, E. L. and G. Casella (1998) *Theory of Point Estimation*, Springer-Verlag.