Universitat Autònoma de Barcelona

**2018/2019**

# Statistical inference

Code: 100128
ECTS Credits: 6

| Degree | Type | Year | Semester |
|---|---|---|---|
| 2500149 Mathematics | OT | 4 | 0 |

## Contact

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## Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

## Teachers

Alejandra Cabaña Nigro

## Prerequisites

Although there are no official requirements, it is recommended to have taken a previous course on Statistical Inference and have a solid background on probability.

## Objectives and Contextualisation

This course gives the mathematical bases of statistical inference, which is the part of Statistics that seeks to obtain information about a population based on the data of a "representative" sample.

We will study the tests of Pearson and Kolmogorov-Smirnov of goodness of fit and other non-parametric tests. We will deal with the stimator's properites suchs as sufficiency and efficiency. We will also study the asymptotic theory that gives us the approcimate distributions of statistics for large samples. More concretely, we will see the asymptotic distributions of the estimator by moments method and of maximum likelihood, and we will use the delta method. We will also present the Neyman-Pearson and likelihood ratio tests.

## Content

**1. Chi-squared tests.**

-Pearson test of goodness-of-fit.

-Chi-squared test for independence and homogeneity.

**2. Other tests of goodness of adjustment.**

-Tests of Kolmogorov-smirnov, Cramér-von Mises and Anderson-Darling.

-Graphic analysis.

**3. Non-parametric techniques.**

-Sign-based tests and inference based on ranks.

-Confidence intervals for quantiles.

**4. Point estimation.**

-Sufficient statistics. Exponential models.

-Cramér-Rao inequality. Concept of efficiency.

-Asymptotic distribution of the maximum lilelihood estimator.

-The delta method.

-Introduction to Bayesian methods.

**5. Parametric hypotheses tests.**

-Neyman-Pearson lemma. Power function.

-The likelihood ratio test.

-Asymptotic distribution of the likelihoods ratio. The "score" and Wald tests.