

# Statistical Methods

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## Course Program

**Week 1** Introduction to statistics, the R programming language, and reproducible research.

- Introduction to main statistical concepts.
- Introduction to the R programming language and to R studio.
- Introduction to reproducible research, version control, cloud computing.

**Week 2** Introduction to probability and statistical inference.

- Introduction to basic concepts of probability.
- Discrete and continuous probability distributions: Binomial, Poisson, Gaussian.
- Distributions derived from the Gaussian: Chi-square, Student's t, Fisher's F.

**Week 3** Parameter estimation.

- Data and empirical distributions.
- Parameters and estimates.
- The central limit theorem.

**Week 4** Statistical inference

- The distribution of the sample mean.
- Confidence intervals.
- Hypothesis testing.
- The bootstrap.

**Week 5** Regression models.

- The simple linear model.

- Multiple linear regression.
- Least squares.
- Normal linear model.

**Week 6** Regression models.

Regression for binary data.

Regression for count data.

Goodness of fit.

Model selection.

Experimental design.

**Week 7** Students' presentations.