

Trainer



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- Holds a PhD in chemistry
- Has extensive computational biology experience, both in academia and industry
- Teaches short courses on biostatistics and scientific programming

Foundations of Statistics

Objective

The main goal of this course is to explain the ideas behind statistical hypothesis testing - to understand "why we do the tests the way we do them".

To this end we first review the foundations (sampling theory, central limit theorem), then we focus on classical hypothesis testing itself. Basic concepts (significance, confidence intervals, error types, test power) will be introduced using Student's t-test as an example.

Finally, an overview of often used statistical tests will be given.

Description

The participants will run simple hands-on exercises to try out the concepts discussed. They will also have the opportunity to run t-tests and power calculations on their own data.

We use the R programming language for exercises. However, the focus of the workshop is to develop a better understanding of statistical hypothesis testing in general, and less on how a particular test function is run in R.

Part 1:

- Sampling theory: obtaining information about a population via sampling. Sample characteristics (location, dispersion, quantiles)
- The importance of the normal distribution: central limit theorem, the distribution of sample means
- The confidence interval of the sample means: chi-square and t-distributions

Part 2:

- Basic principles of statistical hypothesis testing using the t-test as an example
- Properties of the "p-value": the difference between statistical significance and effect size
- Types of errors, power calculations, estimation of necessary sample size
- "Cookbook of tests": Distribution tests, parametric vs. non-parametric tests (t-test vs. Wilcoxon-Mann-Whitney), F-test, counting statistics, contingency tables (chi-square), goodness-of-fit, correlation tests

Out of scope - due to complexity and time constraints:

- Analysis of variance (ANOVA) techniques
- Discussion of research projects of the participants

Condition

Basic familiarity with the R programming language is required. In particular, the following skills are necessary:

- Using the R interpreter, either the command-line program or in R Studio
<https://rstudio.com/>
- Know how to invoke R functions, pass optional / named parameters
- Some familiarity with simple plotting commands

Organizational Information

Language / Format	English / Online
Target group	Doctoral Candidates at all stages and Postdocs (R2/R3) from all faculties
Date	Tuesday-Wednesday, 1-2 Dec 2026, 9:00 – 13:00
Registration	For registration click here