

Statistical principles, fundamentals and applications for Ph.D. students in natural science, 3 credits

1. Confirmation

The syllabus was confirmed by the Head of the Department of Mathematical Sciences 2015-10-05.

Disciplinary domain: Science

Department in charge: Department of Mathematical Sciences

Main field of study: Applied statistics

2. Position in the educational system

Elective course; third-cycle education in the Faculty of Science

3. Entry requirements

There are no requirements for previous courses in the subject. However, it is an advantage to have previously encountered basic statistical methods in e.g. an introductory course.

4. Course content

The aim of this course is to give an introduction to the fundamental concepts and philosophies of mathematical statistics. We will discuss topics such as population, sampling, random variables, distributions and their parameters, dependence and independence and randomization. The course will cover the most common summary statistics such as sample average, standard deviation and empirical correlation. A large part of the course will be devoted to the principles behind the basic statistical inference (e.g. hypothesis testing and confidence intervals). The most common statistical tests, such as t-test, ANOVA, linear regression and Chi-square test will be introduced, focusing on their assumptions and appropriateness of use in different situations. Hands-on exercises using suitable statistical software are included.

5. Outcomes

After completion of the course the Ph.D. student is expected to:

- have knowledge of the most common statistical methods and understand the strengths and the limitations of these
- have the skills to decide which of the above methods is suitable for a certain application, and the ability to perform the necessary calculations and interpret the results
- have the ability to evaluate statistical findings in terms of practical significance and the possibility to relate the results to a more general setting.

6. Required reading

The main reading material will be a text book in statistics. The literature will be determined before the start of the course. There will also be hand-outs and links to further reading.

7. Assessment

Passing grade requires a passing grade on the homework and on the final written or take-home exam.

A Ph.D. student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Department of Mathematical sciences.

In cases where a course has been discontinued or major changes have been made, a Ph.D. student should be guaranteed at least three examination occasions (including the ordinary examination occasion) during a time of at least one year from the last time the course was given.

8. Grading scale

The grading scale comprises Fail (U), Pass (G)

9. Course Evaluation

The course evaluation is carried out together with the Ph.D. students at the end of the course, and is followed by an individual, anonymous survey. The results and possible changes in the course will be shared with the students who participated in the evaluation and to those who are beginning the course.

10. Language of instruction

The language of instruction is English.