

parameters and confidence intervals.

- Hypotheses and statistical tests for a set of estimates including proportions, means, and frequencies: e.g. Student's T-test, Chi-square test etc.
- The framework of the (linear) regression analysis: relations between variables, testing model parameters, variance analysis, model selection.
- Modelling using linear regression models: additive models, interaction models, ANOVA models, post hoc testing.

Initial competences

We expect students to have:

- A basic knowledge of calculus (mathematical notation, function analysis, limits, derivatives, integrals) and probability theory (random variables, basic probability calculations, common distributions).
- A knowledge of basic data science (variable types, common measures of center and spread of a sample distribution).
- Digital literacy: knowledge of computer basics (folder structures, file types, installing and executing software) coupled with a basic proficiency in performing tasks on any operating system.
- A basic knowledge of scientific computing using any language/software package. Knowledge of R specifically is useful but certainly not required.

Final competences

- 1 Understanding the basic concepts of statistical inference.
- 2 Performing a complete statistical analysis in R, starting from a dataset and a research question.
- 3 Recognizing important problems/limitations in study design and analysis methods.
- 4 Understanding how limitations of the study may affect conclusions based on their results.
- 5 Understanding how limitations of the study may affect conclusions based on their results.
- 6 Reporting the results of a statistical data analysis concisely and clearly.
- 7 Translating the results of a statistical data analysis into layman terms.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture, Practical, Independent work

Extra information on the teaching methods

Theoretical concepts are explained and taught in classical ex-cathedra lectures. In the practical sessions, students are able to work through exercises guided by our teaching staff. Progress can be self-evaluated by the students using (mandatory) online self-tests.

Study material

None

References

J. Neter, M. Kutner, C. Nachstheim, W. Wasserman. 'Applied Linear Statistical Models', 5th edition. McGraw-Hill Education, 2005

Course content-related study coaching

During the exercise sessions the students are coached by assistants. Through the electronic learning environment students can exchange questions and answers outside lecture hours among themselves and with lecturers. Individual questions may be answered during a meeting with the lecturer after making an appointment.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Skills test, Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Skills test, Written assessment with open-ended questions

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Examination methods in case of non-periodic assessment:

The default examination method is non-periodic/continuous assessment (see 'Extra information NPE' below), in the form of online tests with multiple choice and open ended questions; written assignments with open ended questions.

Examination methods in case of periodic assessment

If students do not pass the first examination (NPE during the semester), then they will take the second chance examination, in the form of a written exam (see 'Evaluation for periodic evaluation (PE; second exam chance).

Extra information for non-periodic evaluation (NPE)

Students are evaluated throughout the semester upon completion of a substantial and comprehensive part of the course (divided into 5 parts). The first three tests are performed online, the last two parts are performed in a PC lab – only the written part is graded:

- NPE1: introduction and basic principles of statistics – online test;
- NPE2: Statistical inference and decision making – online test;
- NPE3: Hypothesis tests – online test;
- NPE4: Construction of a linear model/prediction – written test;
- NPE5: Generalized linear hypothesis testing – written test.

All parts of non-periodic evaluation assess both theoretical concepts and application of data analytical and statistical methods (by use and interpretation of R statistical software). This assessment format is intended to keep students active in keeping up with the course material over the semester.

Remark: If students are not able to participate in the NPE, e.g. due to international mobility or other exceptional circumstances (i.e. after failing two exam chances in the previous academic year), they will be offered two exam chances of the periodic evaluation format (one in the first exam period and one in the second exam period).

Evaluation for periodic evaluation (PE; second exam chance)

Students are evaluated through a written exam assessing both theoretical concepts and application of data analytical and statistical methods (by use and interpretation of R statistical software).

Remark: For students that are abroad during the second semester due to international mobility, the second exam chance will be provided during the first exam period (i.e. early January). This exam chance will also be opened to students unable to follow the NPE due to international mobility (see evaluation for NPE).

Calculation of the examination mark

Non-periodic evaluation (NPE):

All parts of NPE are weighted by their importance and respective proportion of the course: NPE1 (2 pts) + NPE2 (2 pts) + NPE3 (2 pts) + NPE4 (6 pts) + NPE5 (8 pts) resulting in a final score on a total of 20 points.

Periodic evaluation (PE):

PE is scored entirely based on the written exam, resulting in a final score on a total of 20 points.

Facilities for Working Students

Upon agreement by the teaching team, work students that are not able to participate in the NPE can be offered two exam chances of the periodic evaluation format (see Details of evaluation section).

