STA040   Applied regression analysis with examples from health sciences, 7.5 credits

Tillämpad regressionsanalys med exempel från hälsovetenskaper, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Institute of Medicine on 2023-02-15 to be valid from 2023-08-28, autumn semester of 2023.

Field of education: Medicine 100%
Department: Institute of Medicine

Position in the educational system

The course is offered as a freestanding course on advanced level, targeting students of health sciences, social science, science, economics, engineering, or similar, with an interest in quantitative methods.

Main field of studies	*Specialization*
-	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

The entry requirements of the course are at least 120 credits and English B/English 6. In addition, at least 5 credits in statistics or quantitative methods are required.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding
  • Describe the type of questions that can be tackled by applying regression models

frequently used in health sciences, and state factors relevant to the choice of an appropriate model.
- State the type and format of variables necessary as input to different models.
- Define basic measures for model comparison and describe strategies for model building, their implications and pitfalls.

Competence and skills
- Construct a model formula and explain the meaning of the model coefficients.
- Fit regression models frequently used in health sciences using statistical software.
- Evaluate the model fit, interpret the results and communicate them in writing and orally.

Judgement and approach
- Critically assess the choice of a model for the data and research question at hand.
- Discuss strengths and limitations of different analysis approaches.
- Reflect on ways of documenting the analysis and reporting the results, from the perspective of both reproducibility and comprehensibility.

Course content

The course introduces regression models frequently used in health sciences. The exposition starts from linear regression and introduces several covariates, interactions, and incorporation of non-linear relationships, e.g. through splines. These concepts are further reinforced when discussing the logistic, the Poisson, and the Cox proportional hazard models. Prior to introducing the hazard models, survival data and their summaries through the Kaplan-Meier survival curve and the cumulative incidence curves are explained.

Further, the students will learn about methods for assessing model fit and strategies for model building. The difference between predictive modeling and drawing causal conclusions from the analysis will be discussed.

The computer labs with statistical software provided regularly during the course give the students the opportunity to gain practical skills in fitting the discussed regression models and in reporting and interpreting the outcomes of the analysis. A particular focus is placed on understanding what is important when documenting and reporting the technical details of an analysis, in order to make the results understandable and reproducible for others.

The methods will be presented using problems from health sciences.

Form of teaching

The course is an online course, consisting of a mixture of pre-recorded materials and live

online lectures, seminars, and computer exercises. The teaching takes place on digital platforms. The course also involves individual work and group work.

Language of instruction: English

Assessment

Three individual home assignments, presented in writing and orally.
Active participation in at least one of the live online elements of the course.

If a student has failed the same examined component twice and wishes to change examiner before the next examination, such a request should be made to the department in writing and should be approved by the department unless there are special reasons to the contrary (Chapter 6 Section 22 of the Higher Education Ordinance).

If a student has received a recommendation from the University of Gothenburg for study support for students with disabilities, the examiner may, where it is compatible with the learning outcomes of the course and provided that no unreasonable resources are required, decide to allow the student to sit an adjusted exam or alternative form of assessment.

In the event that the course has ceased or undergone major changes, students are to be guaranteed at least three examination rounds (including the ordinary examination during the course) over a period of at least one year, but no more than two years, after the course has ceased/been changed.

Grades

The grading scale comprises: Pass (G) and Fail (U).

Course evaluation

The course evaluation is carried out in the form of an anonymous questionnaire. A compilation of the questionnaire is done by the course coordinator. The result and potential changes should be shared with both the students who carried out the evaluation and the students that are about to start the course.

Additional information

- The course is given as an online course. A computer with internet, web camera and a microphone, and with the possibility to install R and RStudio, is necessary to be able to follow the course (prior knowledge of R programming is not required).
- Regarding the content of the previous course in statistics: it is expected that the student knows about and understands the concept of statistical hypothesis testing,

p-value, confidence intervals, and how to summarize different types of variables (numerical and categorical). Basic knowledge of simple linear regression is an advantage.