Quantile Regression, 1,5 higher education credits

Third cycle

1. Confirmation
The syllabus was confirmed by the Council for Research Education on 2014-09-16 to be valid from spring semester 2015
Responsible institute: Medicin

2. Position in the educational system
The course is an elective course within the Third cycle at the Sahlgrenska Academy.

3. Entrance qualifications
Admitted to postgraduate education
Completed the introductory course and either passed the course Medical Statistics 1 or more extensive statistical training at undergraduate level.

4. Course content
Skewed data, ordinal or nominal data is common in medical research. For example when measurements are not following a Normal distribution or questionnaire based scales are used. The following areas are central to the course:

- Restricted data: Nominal and ordinal scales, e.g. VAS, questionnaire based instruments
- Skewed data or data where the variation is not constant for different values of the variable (heteroskedasticity)
- Percentage change
- Reference intervals
- Effects dependent on the percentile
- Robust methods, less sensitive to extreme values
- Discussion of the advantage of an invariant estimator. That is, an estimator measuring the same entity independently of transformation of the variable. For example is a median of a log-transformed variable equal to the log of the median of the un-transformed variable (invariance). For a mean this is not true.
- Quantile regression in relation to other methods.

5. Learning outcomes
After completing the course the student is expected to be able to:

Knowledge and understanding
- Chose relevant methods for the analysis of nominal, ordinal, skewed and restricted data.
- Explain the pros and cons with different methods of linear regression, logistic regression and survival analysis.
- Interpret and explain the graphical representation of results from a quantile regression analysis; measures of location and variation, and the confidence intervals for these
- Understand the principles behind splines and bootstrapping
- Perform practical application, in the statistical package STAT, of simple examples of these regression methods

**Skills and abilities**
- Perform practical application of quantile regression analysis of relevant data from medical applications, and to interpret the results.
- Understand the statistical assumptions that must be met for and when it is appropriate to use quantile regression
- To be able to discuss the pros and cons of such an analysis and how that effects the choice of method.

**Judgement and approach**
- Judge the need of a specific statistical analysis and data in related to a research question.

6. **Required reading**
Scientific papers will be handed out. Additional suggested reading will be given.

7. **Assessment**
The mandatory homework exercises and the mandatory computer exercises will be examined continuously throughout the course.
The student has the right to change examiner after having failed twice in the same examination, if practicable. Such a request is made to the department and shall be in writing.
A 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 Institute.
A doctoral 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 Institute.

8. **Grading scale**
The grades are Pass or Fail.

9. **Course evaluation**
The Sahlgrenska Academy's common course evaluation will used in the last lecture.

10. **Additional information**