**SM00114 Statistical analysis of registry based studies, 3 credits**

Statistisk analys av registerbaserade studier, 3 högskolepoäng

*Third-cycle level / Forskarnivå*

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**Confirmation**

This syllabus was confirmed by the Council for PhD Education at Sahlgrenska Academy on 2020-03-30, and is valid from Autumn semester 2020.

**Responsible Department**

Institute of Medicine, Sahlgrenska Academy

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**Entry requirements**

Admitted to doctoral education and completed the course in regression modelling or corresponding.

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**Learning outcomes**

After completing the course the doctoral student is expected to be able to:

- **Knowledge and understanding**
  - Understand sources of bias in registry based studies

- **Competence and skills**
  - Use directed acyclical graphs (DAGs) to visualize causal assumptions
  - Design registry studies such that the risk of bias, e.g. immortal time bias and confounding, is minimized
  - Use the statistical software R to implement statistical analysis if registry data

- **Judgement and approach**
  - Critically evaluate design, analysis and results from registry based studies
  - Select statistical methods to address confounding and estimate treatment effects
  - Interpret the results using a causal inference framework.
Course content

Clinical research based on registry data such as administrative health care data bases, quality registers and other population based data sources has become increasingly popular and are often published in top ranking journals. In Sweden we have excellent opportunities for these types of studies as the use of a unique personal identifier together a long tradition of creating and developing registries allows for perfect linkage between registries often with very long follow up time across several data sources. This course will focus on sources of systematic errors and how statistical analysis techniques can be used to minimize the effect of these errors. The participants will have the opportunity to implement the analysis techniques using the statistical software R through practical hands on training sessions.

- Sources of bias in registry studies
  - Selection bias,
  - Immortal time bias,
  - Reverse causality
  - Confounding
- Introduction to causal inference using counterfactual outcomes
- Statistical analysis of registry data using R
  - Regression modelling
  - Propensity score matching
  - Inverse probability of treatment weighting
- Introduction to alternative approaches e.g. instrumental variables

Types of instruction

Lectures, computer exercise and self-studies.

Language of instruction

The course is given in Swedish but can be given in English if necessary.

Grades

The grade Pass (G) or Fail (U) is given in this course.

Types of assessment

The examination consists of active participation in class discussions, computer exercise sessions and an individually written take-home exam.

If a student, who has been failed on the same examining course component twice, requests a change of examiner before the next examination session, a request of this kind should be sent in writing to the department responsible for the course, and granted, unless there are special reasons to the contrary (Chapter 6, Section 22, Higher Education Ordinance).

Course evaluation

The evaluation will be performed using a written survey. The result and any changes in the set-up of the course shall be communicated both to the students that carried out the evaluation and
to the students who are about to start the course.