Statistics and Data Science II

Statistik och dataanalys II
7.5 credits

Single subject course

771A18

Valid from: 2018 Autumn semester

Determined by	**Main field of study**	
The Quality Board at the Faculty of Arts and Sciences	Computational Social Science	
Date determined	**Course level**	**Progressive specialisation**
2017-10-20	Second cycle	A1N
Revised by	**Disciplinary domain**	
	Technology	
Revision date	**Subject group**	
	Other Subjects within Social Science	
Offered first time	**Offered for the last time**	
Autumn semester 2018		
Department	**Replaced by**	
Institutionen för ekonomisk och industriell utveckling		

Entry requirements

- 180 ECTS credits passed including 90 ECTS credits within one of the following areas humanities, social-, cultural-, behavioural-, natural-, computer-, or engineering-sciences
- 15 ECTS credits passed in one or several of the following subjects:
  Statistics
  Mathematics
  Computer science
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6)
  Exemption from Swedish

Intended learning outcomes

After completion of the course, the student should at an advanced level be able to:

- use statistical software to estimate appropriate linear regression models for cross-sectional and panel data and explain the statistical principles underlying these estimates;
- use statistical software to assemble appropriate data structures for estimating regression models and implementing robustness checks;
- interpret the parameters of linear regression models, produce predictions, and evaluate goodness of fit;
- describe the logic of causal inference and how it applies to regression models, distinguishing between causality and correlation;
- identify common threats to causal interpretation of linear models, and assess and justify modeling approaches for solving these threats;
- evaluate the validity and robustness of causal inferences under a variety of assumptions about how the data was generated.

Course content

This course introduces the principles and practice of linear regression modeling. Underlying model assumptions are reviewed and scrutinized. In intensive computer laboratories, statistical tools for creating appropriate data structures and estimating models using real data are presented and guidance is provided in interpretation of model parameters. The remainder of the course focuses on causal inference and the potential outcomes framework. Panel data models and statistical tools for their estimation are presented, and their potential to improve causal inference are compared. Discussion is extended to consider natural experiments and instrumental variable approaches to causal inference. The sensitivity of estimates to violations of model assumptions are evaluated, with special attention given to methods centering on computer simulation.

Teaching and working methods

The teaching consists of readings, lectures, seminars, and interactive computer labs. Homework and independent studies are a necessary complement to the course.
Language of instruction: English.

Examination

The course is examined through written assignments, completed computer laboratories, and a final indivdual written assigment. Detailed information about the examination can be found in the course's study guide.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it.

If the coordinator has recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

Grades

ECTS, EC

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.