



DEPARTMENT OF EDUCATION AND SPECIAL EDUCATION

QRM2300 Geometric Data Analysis in Educational Research, 7.5 credits

Geometrisk dataanalys inom utbildningsvetenskaplig forskning, 7,5 högskolepoäng
Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Department of Education and Special Education on 2023-03-16, and was last revised on 2023-09-27. The revised course syllabus is valid from Spring semester 2024.

Responsible Department

Department of Education and Special Education, Faculty of Education

Entry requirements

For admission to the course, the applicant has to be registered as a doctoral student in the third cycle or have a doctoral degree. The applicant should also have documented prior knowledge corresponding to the learning goals in the QRM course Basic statistics for educational research, 7.5 credits, and Introduction to quantitative methods in educational research, 7.5 credits or similar.

Learning outcomes

Geometric Data Analysis (GDA) consists of a wide-ranging set of methods for multivariate statistics that models data sets as clusters of points in multidimensional Euclidean spaces, allowing for a more comprehensive interpretation of data based on the relationships between the clouds of points. The course provides a general introduction to the theoretical principles and the mathematical basics of geometrical data analysis, and an understanding of how these methods can be applied to studies in the social sciences, especially in educational research. After successful completion of the course, the student should be able to:

Knowledge and understanding

- Explain key concepts in geometric data analysis.
- Explain the basic mathematical starting points for geometric data analysis,

- Understand theoretical principles of geometric data analysis.

Competence and skills

- Use statistical software for geometric data analysis,
- Present the basic mathematical starting points for geometric data analysis,
- Carry out geometric data analysis on empirical materials and present the results in a correct way.

Judgement and approach

- Critically analyse to what studies geometric data analysis can be applied.
- Reflect on the limitations and advantages in GDA and in which ways geometric data analysis can best be applied in specific examples.
- Reflect on and evaluate application of GDA in scientific journal articles.

Sustainability labelling

The course is sustainability-related, which means that at least one of the learning outcomes clearly shows that the course content meets at least one of University of Gothenburg's stipulated criteria for sustainability labelling.

Course content

The course introduces principles for how Geometric Data Analysis in educational contexts can be implemented. Several key elements of GDA are covered in the course:

- Formalization: a valuable guide for constructing clouds.
- Interpretation assistance: an essential component to interpret the results of GDA.
- Simple and multiple correspondence analysis: effective for analysing large questionnaires.
- Structured data analysis: a combination of GDA and variance analysis.
- Statistical inference integrated into GDA.
- The strategy of conducting data analysis in GDA.

Types of instruction

The main part of the course will be in online format. At the beginning of the course, there will be three on-campus days with lectures, workshops and hands-on. Course participants are expected to work independently and take responsibility for their own learning by reading the course literature and perform the tasks that are assigned by the course leaders. The teaching is largely based on the course participants themselves actively process the course literature, as well as prepare and participate in seminars and independently perform practical exercises in accordance

with given instructions.

Course participants are expected to take responsibility for their learning, individually and in groups, by reading the course literature and actively participating in seminars and group work, and by participating in practical exercises and completing the tasks assigned by the course leader.

Language of instruction

The course is given in English.

Language of instruction is English, unless all participants agree on Swedish

Grades

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

The grading scale comprises the grades Pass (G), Fail (U).

Types of assessment

To pass the course requires both active participation and successful fulfillment of the examination tasks. The examinations are divided into critical reviews of intervention studies and a task of operationalizing a research question/hypothesis in conjunction with planning an intervention study. The third examination tasks also include writing a review of another participant intervention study and presenting the result for the rest of the course participants.

Course evaluation

The course will be evaluated after the course. The results will be used as a guide for improving the course.

Other information

In order to participate in the course, access to own computer / laptop is needed together with computer accessories for online communication (camera, headphones, mic) and the required statistical software (see list of literature).

The number of participants is limited to 15. Priority will be given to doctoral students with an educational sciences focus, secondly supervisors for doctoral students with a focus on educational science research and thirdly researchers with a doctoral degree and an interest in quantitative designs and analyses.