

Syllabus: Statistics 1

The aim of the course is to provide skills for interpreting and doing data analysis, with a particular focus on estimation and linear models. Practical skills, using the statistical software R, is trained in a combined group and individual assignment involving a full data analysis of a given data set. A satellite course entitled “learn R by EXample” (REX) is included, to get started with R.

Course code

Master program: PSMT59; Doctoral program: PS303F. It is the same course given at two levels, the only difference is examination criteria and grades.

Prior knowledge

The course assumes prior knowledge corresponding to the content of Borg & Westerlund (2012). *Statistik för beteendevetare (3 ed.)*. Stockholm: Liber.

Learning outcomes

After completing the course, you will have improved your ability to:

- data management: screening, cleaning, sharing,
- summarize and visualize data,
- interpret and derive point estimates and compatibility intervals,
- understand and apply linear and logistic regression models,
- plan and conduct statistical analyses of data, including data management, data screening, descriptive analysis, data visualization, and effect size estimation.
- use the software R for analyzing real (and simulated) data
- follow Open Science practices

Course content

The course will cover the following topics:

- Data management and data screening
- Descriptive statistics and data visualization
- Parameter estimation with compatibility intervals
- Linear and generalized linear models
- Practical data analysis using R
- Open Science

Activities

The course consists of lectures, seminars, and group discussions linked to the individual assignment. Teaching will take place in *real life* with no or limited possibilities for online participation.

The course consists of lectures and computer exercises. One seminar is devoted to the student’s presentations of their individual assignments.

Combined group and individual assignment

Group task: (1) Write a Result section and a Conclusion section based on analyses of a selected data-set. Several data sets will be available. (2) Submit an R-script that contains all and only the analyses in your report. (3) Prepare a slide-show presentation and (4) present it at the last seminar (joint presentation of group members).

Individual task: Draw your own key figure of the results. Try to improve on your own group's key figure! Submit your figure with caption (pdf-format) and the R-code to generate it. It is OK if the code is similar to others in your group, but you need to provide your own script *with your own comments* explaining what your code does. All figures submitted will be considered for the prestigious "Best Illustration of Statistical Data Award". A small price and great honor to the winner announced at the end of the presentation seminar.

Deadline for both group and individual tasks: 09.00 of the day of the presentation seminar.

Examination

The written exam is scored 0 to 28 points. The group assignment is scored pass or fail (= revise), but up to 3 points may be awarded for excellence and be added to the exam score of each group participant. In addition, the individual figure and R-script may receive up to 2 excellence points added to the individual's exam score. Together, the written examination and the individual assignment may give a *total score* of at most $28 + 3 + 2 = 33$ points.

Grading Master level (PSMT58). The course is graded on the seven-point ECTS-scale (A, B, C, D, E, Fx, F). Grade A requires a *total score* of at least 27 points, B 24-26 points, C 21-23 points, D 18-20 points and E 15-17 points (F: < 15 points). In addition, grades A-E requires passed group assignment and passed individual assignment.

Grading Doctoral level (PS302FO). The course is graded "pass" or "fail". Grade "pass" requires a *total score* of at least 21 points. In addition, grade "pass" requires passed research ethics seminar, and passed group assignment.

Literature

Reference	Abbrvtn	No of pages
Gelman, A., Hill, J., and Vehtari, A. (2021). <i>Regression and Other Stories</i> . Cambridge: Cambridge University Press. ISBN: 9781107676510. available online: https://users.aalto.fi/~ave/ROS.pdf Selected parts of chapters 1-5; 6-8, 10-12, 13-14, and appendix A and B. see reading instructions to be posted on Athena	ROS	350
Wilkinson L. & the APA Task Force on Statistical Inference (1999). Statistical methods in psychology journals. Guidelines and explanations. <i>American Psychologists</i> , 54, 594-604. www.apa.org/pubs/journals/releases/amp-54-8-594.pdf	W	11
Amrhein, V., Greenland, S., & McShane, B. (2019). Retire statistical significance. <i>Nature</i> , 567, 305-307. doi.org/10.1038/d41586-019-00857-9	A	3
Nilsson, M.E. (2024). Lecture notes. Link to be posted on Athena.	MN	NA

Schedule: see Athena