

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 an individual assignment involving a full data analyses 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:

- summarize and visualize data,
- use probability theory to update beliefs (very basic introduction to Bayesian stats),
- interpret and derive point estimates and compatibility intervals,
- understand and use methods based on the general and generalized linear model,
- 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
- Very basic introduction to Bayesian inference
- Parameter estimation with compatibility intervals
- General (and generalized) linear models
- Practical data analysis using R
- Open Science

Hybrid teaching: In real life and online

The course consists of lectures, seminars, and group discussions linked to the individual assignment. Teaching will take pace in *real life with possibilities for online participation* (so called “hybrid” teaching). It is up to you whether you want to participate in real life or online (using zoom). The lecture rooms are equipped for real time streaming of lectures and for interaction from online participants. Hopefully, this technology will work fine, so everyone may participate in the discussions. My guess is that you will *benefit much more* from the seminars if you attend in real life, so make that your first choice.

Activities

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

Individual assignment

Task: (1) To write a Result section and a Conclusion section based on analyses of a selected data-set. Several data sets will be available. (2) Write R-code with all the analysis, and (3) Prepare a slide-show presentation and be prepared to present it at the last seminar. The written text, the R-code and the slide-show presentation should be submitted on Athena no later than 16.00 the day before the last seminar.

Examination

The course is graded on the seven-point ECTS-scale (A, B, C, D, E, Fx, F). The grade is based on the result of the written exam and on the quality of the individual assignment. The exam is scored from 0 to 20 points; a minimum of 10 points is required, if less, the exam has to be retaken. The individual assignment is scored from 0 to 12 points; a minimum of 3 points is required, if less, a revised version has to be submitted which will be given a maximum of 3 points. The scores from the written exam and the individual assignment are added to form a *total score*.

Grading Master level (PSMT59). 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 (Fx 12-14 points, F < 12 points). Half scores are rounded upward, so a total score of, say, 23.5 would be rounded to 24 and be given grade B.

Grading Doctoral level (PS303FO). The course is graded "pass" or "fail". Grade "pass" requires a *total score* of at least 21 points.

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 1-12, and a few selected parts of 18-20, see reading instructions to be posted on Athena	GHV	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. (2023). Lecture notes. Link to be posted on Athena.	MN	NA

Schedule: see Athena