

Statistical methods in natural sciences (VT 2021)

Location: XXX (unclear) at EBC, entrance at Norbyvägen 18D.

Course text book: Quinn, G.P. and Keough M.J. 2002. *Experimental design and data analysis for biologists*. Cambridge. This very good, classic and general book (although examples are biological) is required reading, and should be purchased, borrowed or otherwise be made available, well ahead of time by everyone taking the course.

I note that the course book is also available in electronic format (as a PDF).

Note 1: The course **assumes** that you have a basic understanding of statistical estimation and inference (make sure to **read chapters 1-3** in the course text book!).

Note 2: Parts of the course (presentation of practicals) may run remotely via Zoom - practical details later.

Teachers: Göran Arnqvist (Goran.Arnqvist@ebc.uu.se). Responsible for the practicals is Mareike Koppik (mareike.koppik@ebc.uu.se).

Date	Time	Topic	Reading ¹
Tue 26/1	13.00 -15.30	Course start - information and introduction. L1: Statistical inference, power analysis and experimental design. Introduction to practical I. Brief introduction to statistical software (at the end).	Pp 32-44; 155-172; A.
Thu 28/1	12.00 -13.00 ²	<i>R support/workshop</i>	
Thu 28/1	13.00 -15.30	L1 continued and L2: Meta-analysis. Presentation of practical I.	Pp 50-51; A.
Tue 2/2	13.00 -15.30	L3: Linear regression and multiple regression analysis.	Pp 72-99; 111-142.
Thu 4/2	13.00 -15.30	L4: One-way analysis of variance and F-tests, transformations of data.	Pp 58-68; 173-207.
Tue 9/2	13.00 -15.30	L5: More complex linear models: nested, factorial, randomized blocks and repeated measures designs.	Pp 208-254; 262-273; 301-315.
Thu 11/2	13.00 -15.00	L6: Analysis of covariance. Introduction to practical II.	Pp 339-352.
Tue 16/2	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 16/2	13.00 -15.30	Presentation of practical II.	
Thu 18/2	13.00 -15.30	L7: Generalized linear models, including logistic regression and linear models with Poisson and binomial errors. Introduction to practical III.	Pp 359-372.
Tue 23/2	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 23/2	13.00 -15.30	Presentation of practical III.	
Thu 25/2	13.00 -15.30	L8: Resampling and randomization techniques; χ^2 based analyses of frequencies. Introduction to practical IV.	Pp 25-26; 45.
Tue 2/3	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 2/3	13.00 -15.30	L9: Multivariate methods I: Principal Component Analysis, Discriminant Function Analysis and Manova. Presentation of practical IV.	Pp 401-417; 425-458.
Thu 4/3	13.00 -15.30	L10: Multivariate methods II: multivariate classification and ordination techniques. Introduction to practical V.	Pp 459-493.
Tue 9/3	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 9/3	13.00 -15.30	Presentation of practical V.	
Thu 11/3	13.00 -15.30	L11: Other current topics in statistics (morphometrics, Bayesian inference, mcmc estimation)	A
Tue 16/3	13.00 -15.30	Final literature discussion - discuss book and solve/discuss a series of hand-out questions.	

¹ Page numbers refer to the course text book; A = refers to separate material that will be distributed by email.

² Non-mandatory **R** support session, for those that want and/or need some help to make progress with the practicals in R.