

Statistical methods in natural sciences (VT 2020)

Location: Seminar room 1003 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 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.

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

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Date	Time	Topic	Reading ¹
Tue 21/1	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 23/1	12.00 -13.00 ²	<i>R support/workshop</i>	
Thu 23/1	13.00 -15.30	L1 continued and L2: Meta-analysis. Presentation of practical I.	Pp 50-51; A.
Tue 28/1	13.00 -15.30	L3: Linear regression and multiple regression analysis.	Pp 72-99; 111-142.
Thu 30/1	13.00 -15.30	L4: One-way analysis of variance and F-tests, transformations of data.	Pp 58-68; 173-207.
Tue 4/2	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 6/2	13.00 -15.00	L6: Analysis of covariance. Introduction to practical II.	Pp 339-352.
Tue 11/2	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 11/2	13.00 -15.30	Presentation of practical II.	
Thu 13/2	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 18/2	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 18/2	13.00 -15.30	Presentation of practical III.	
Thu 20/2	13.00 -15.30	L8: Resampling and randomization techniques; χ^2 based analyses of frequencies. Introduction to practical IV.	Pp 25-26; 45.
Tue 25/2	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 25/2	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 27/2	13.00 -15.30	L10: Multivariate methods II: multivariate classification and ordination techniques. Introduction to practical V.	Pp 459-493.
Tue 3/3	12.00 -13.00 ²	<i>R support/workshop</i>	
Tue 3/3	13.00 -15.30	Presentation of practical V.	
Thu 5/3	13.00 -15.30	L11: Other current topics in statistics (morphometrics, Bayesian inference, mcmc estimation)	A
Tue 10/3	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.