### Statistical methods in natural sciences (VT 2017)

**Location:** Seminar room 1003 at EBC, entrance at Norbyvägen 18D.

**Course textbook:** Quinn, G.P. and Keough M.J. 2002. *Experimental design and data analysis for biologists. Cambridge.* This very good and general book 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 (corresponding to chapters 1-3 in the course textbook).

**Teachers:** Göran Arnqvist (Goran.Arnqvist@ebc.uu.se). Responsible for the practicals is Elisabeth Bolund (elisabeth.bolund@ebc.uu.se).

### Date | Time | Topic | Reading
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Tue 24/1 | 12.00 - 14.00 | **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 26/1 | 12.00 - 13.00 | **R support/workshop** |  
Thu 26/1 | 13.00 - 15.30 | **L1** continued and **L2**: Meta-analysis. Presentation of practical I. | Pp 50-51; A.  
Tue 31/1 | 13.00 - 15.30 | **L3**: Linear regression and multiple regression analysis. | Pp 72-99; 111-142.  
Thu 2/2 | 13.00 - 15.30 | **L4**: One-way analysis of variance and F-tests, transformations of data. | Pp 58-68; 173-207.  
Tue 7/2 | 12.00 - 14.00 | **L5**: More complex linear models: nested, factorial, randomized blocks and repeated measures designs. | Pp 208-254; 262-273; 301-315.  
Thu 9/2 | 13.00 - 15.30 | **L6**: Analysis of covariance. Introduction to practical II. | Pp 339-352.  
Tue 14/2 | 12.00 - 13.00 | **R support/workshop** |  
Tue 14/2 | 13.00 - 15.30 | Presentation of practical II. |  
Thu 16/2 | 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 21/2 | 12.00 - 13.00 | **R support/workshop** |  
Thu 21/2 | 13.00 - 15.30 | Presentation of practical III. |  
Tue 28/2 | 12.00 - 14.00 | **L8**: Resampling and randomization techniques. Introduction to practical IV. | Pp 25-26; 45.  
Thu 2/3 | 12.00 - 13.00 | **R support/workshop** |  
Tue 14/3 | 12.00 - 14.00 | **L10**: Multivariate methods II: multivariate classification and ordination techniques. Introduction to practical V. | Pp 459-493.  
Thu 16/3 | 12.00 - 13.00 | **R support/workshop** |  
Thu 16/3 | 13.00 - 15.30 | Presentation of practical V. |  
Tue 21/3 | 13.00 - 15.30 | **L11**: Other current topics in statistics (morphometrics, Bayesian inference, mcmc estimation) | A  
Thu 23/3 | 13.00 - 15.30 | Final literature discussion - discuss book and solve/discuss a series of hand-out questions. |  

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

2 Non-obligatory R support session, for those that want help to do the practicals in R.