Introduction to maximum likelihood and Bayesian statistics for ecologists (17-19 October 2023, FZP CZU, room D324)

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Summary
This 2.5-day course is an introduction to applied statistics that uses either maximum likelihood, or Bayesian inference. The course has two objectives. First, it will introduce the critical concepts unifying all parametric statistical techniques; these are: likelihood, probability distributions, and the distinction between model, data, parameters, and predictions. Second, the course will show that one can do statistics outside of the classical categories such as regression or ANOVA, and that statistics can work as a modular kit in which several simple blocks can be used to analyze problems of any complexity. Participants will learn to specify and fit models using likelihood maximization in R, and using MCMC in OpenBUGS, JAGS, or STAN. The course emphasizes practical issues over philosophical ones. We will use mainly ecological examples.

How to apply?

- Sign in here: https://shorturl.at/dHOQX
- Capacity is 14 people, we select participants on a first-come first-served basis.

What should you bring?

• Your own laptop with R and JAGS installed. If you have problems with the installation, get in touch.

• Basic familiarity with R is required: You should know how to set a working directory, how to import and export data, you should know how R indexing (the square brackets [,]), and you should be familiar with the following types of objects: vector, data.frame, and list. Knowledge of loops will be an advantage.

Location: Room D324 (capacity 14 participants)

Tuesday 17 October – Introducing maximum likelihood estimation and Bayes with Manuele

- 9:00 - 12:00: Intro to data and models, likelihood, probability distributions, practical examples of using likelihood;
- 13:00 - 16:00: Bayes rule, Bayesian parameter estimation (grid and quadratic approximation, MCMC).

Wednesday 18 October – Practical modelling in JAGS with Petr

- 9:00 - 12:00: Intro to JAGS. Simple models: regression (normal, logistic, Poisson), ANOVA;
- 13:00 - 15:30: More complex models: hierarchical ANOVA, occupancy model.

Thursday 19 October – Bayesian afterparty with Manuele & Petr

- 10:30 - 12:00: Open discussion, practical problem solving, issues, criticism.