Masterstudiengang Medical Biometry/Biostatistics

Bayesian Statistics

Aims and Course content

Most statisticians are well trained in frequentist statistical analyses, with a toolbox that covers techniques from simple testing procedures up to complex modeling approaches. This course aims to teach basic and advanced techniques in a Bayesian framework. We will start with the basic Bayesian principles and the way of thinking. After that, classical linear and generalized linear regression models will be discussed and applied in a Bayesian context. We will also dive into hierarchical models, before we briefly touch more advanced topics and complex modeling techniques by case studies. At the end of the course, the participants will be able to understand the Bayesian idea of statistical modeling and will know how to apply these models to various data problems. Furthermore, the participants will be trained in the correct interpretation of the resulting parameter estimates.

Programme (subject to change)

- Introduction to Bayesian statistics
- Bayesian linear models
- Bayesian generalized linear models
- Bayes classifier
- Bayesian hierarchical models
- Advanced Topics I – Bayesian statistics in pediatric drug development
- Advanced Topics II – case study

Pre-requisites

The participants must have basis knowledge in R programming; statistics and probability theory; (generalized) regression models.

Course readings

- Christensen, R., Johnson, W., Branscum, A., Hanson, T.E. Bayesian Ideas and Data Analysis - An Introduction for Scientists and Statisticians. 2011.
- Kruschke, JK. Doing Bayesian Data Analysis: A Tutorial with R, JAGS, and Stan. 2015.