EITM Summer Institute Oslo 2023, June 28th to 30th 2023
Richard Traunmüller, University of Mannheim
traunmueller@uni-mannheim.de

Statistical Foundations of EITM

The basic motivation of EITM is it to closely connect formal theoretical models and empirical statistical tests. This course presents flexible statistical methods that lend themselves to testing predictions from formal models. Our course begins with an introduction to probability models, covering random variables, important probability distributions, and Bayes' theorem. We then discuss the use of maximum likelihood as a method to conduct statistical inference, as well as its relationship to the Bayesian framework of inference. Our discussion of Bayesian inference includes coverage of conjugate Bayesian models, as well as common techniques of statistical simulation such as the Gibbs sampler and Metropolis-Hastings algorithm. We will conclude with applications of these ideas to the study of formal models in political science. The course will be split between lectures and hands-on lab sessions. We will use the statistical computing software R.

Textbooks

DeGroot, Morris H., and Mark J. Schervish. 2002. *Probability and Statistics*, Third Edition. Addison-Wesley.

King, Gary. 1998. *Unifying Political Methodology. The Likelihood Theory of Statistical Inference.* Michigan University Press.

Jackman, Simon. 2009. *Bayesian Analysis for the Social Sciences*. Wiley.

Rough Course Plan

Wednesday Afternoon: Probability and Probability Models

Thursday Morning: Maximum Likelihood Methods

Thursday Afternoon: Bayesian Statistics

Friday Morning: Stochastic Simulation Methods

Friday Afternoon: Applied Bayesian Analysis