Universiteit Utrecht

summerschool UTRECHT

A gentle introduction to Bayesian Statistics (Course code S18)

21 – 25 July 2025

Course Director: *Sara van Erp*
E-mail: ms.summerschool@uu.nl

Day	Time	Type	Description	Location
Monday	09:00 – 12:00	Lecture	Conceptual introduction + reasons for using Bayesian methods + discussion on the interpretability of results when using p-values/95%intervals + empirical example of a linear regression analysis in the Bayesian framework. *Useful reference:* *van de Schoot, R., Depaoli, S., King, R. et al. Bayesian statistics and modelling. Nature Review Methods Primers 1, 1 (2021). https://doi.org/10.1038/s43586-020-00001-2*	Utrecht Science Park, exact location will be announced later
	12:00 – 13:00	Lunch		
	13:00 – 16:00	Computer lab	Work on exercises and ask questions.	

Day	Time	Type	Description	Location
Tuesday	09:00 – 12:00	Lecture	Q&A + WAMBS-checklist (when to worry and how to avoid the misuse of Bayesian Statistics) *Useful references:* *Depaoli, S., & Van de Schoot, R. (2017). Improving transparency and replication in Bayesian statistics: The WAMBS-Checklist. Psychological methods, 22(2), 240.* *Van de Schoot, R., Veen, D., Smeets, L., Winter, S. D., & Depaoli, S. (2020). A tutorial on using the WAMBS checklist to avoid the misuse of Bayesian statistics. Small Sample Size Solutions: A Guide for Applied Researchers and Practitioners; van de Schoot, R., Miocevic, M., Eds, 30-49.*	
	12:00 – 13:00	Lunch		
	13:00 – 16:00	Computer lab	Work on exercises and ask questions	

For information about the Social Programme, please have a look at the last page of this document or visit the Utrecht Summer School website!

Universiteit Utrecht

summerschool UTRECHT

Day	Time	Type	Description	Location
Wednesday	09:00 – 12:00	Lecture	Today, we discuss estimation methods including alternatives that can be more efficient when dealing with computational or non-covergence issues. A brief introduction to and the benefits of these estimation methods (MCMC, Gibbs, MH, HMC, NUTS, etc.) will be reviewed. These insights can help to understand differences between software that can be used. Today may be a little more technical (less gentle) but without equations. Useful references: https://chi-feng.github.io/mcmc-demo/ *Jonah Gabry, Daniel Simpson, Aki Vehtari, Michael Betancourt, Andrew Gelman, Visualization in Bayesian Workflow, Journal of the Royal Statistical Society Series A: Statistics in Society, Volume 182, Issue 2, February 2019, Pages 389–402,* https://doi.org/10.1111/rssa.12378	
	12:00 – 13:00	Lunch		
	13:00 – 16:00	Computer lab	Work on exercises and ask questions.	

Day	Time	Type	Description	Location
Thursday	09:00 – 12:00	Lecture	Today we will discuss the importance of prior sensitivity analysis to investigate the influence the prior has on the results. We will focus on models with many parameters to estimate, possibly too many for the model to be identified in a classical sense. We discuss the use of shrinkage priors to estimate these models and select substantial parameters. Useful references: *van Erp, S. (2020). A tutorial on Bayesian penalized regression with shrinkage priors for small sample sizes. Small sample size solutions, 71-84.* https://library.oapen.org/bitstream/handle/20.500.12657/22385/9780367221898_text%20(1).pdf?sequence=1#page=85	
	12:00 – 13:00	Lunch		
	13:00 – 16:00	Computer lab	Work on exercises and ask questions.	

For information about the Social Programme, please have a look at the last page of this document or visit the Utrecht Summer School website!

Day	Time	Type	Description	Location
Friday	09:00 – 12:00	Lecture	Today we elaborate on ways in which informative priors can be specified. We discuss how we can use expert knowledge and previous studies to inform these decisions. We also provide case studies and end with general reflections. *Useful references:* *van de Schoot R, Veen D, Grandfield EM, et al . (2021) The Use of Questionable Research Practices to Survive in Academia Examined With Expert Elicitation, Prior-Data Conflicts, Bayes Factors for Replication Effects, and the Bayes Truth Serum. Front Psychol. doi: 10.3389/fpsyg.2021.621547.* *Veen, D., Stoel, D., Zondervan-Zwijnenburg, M., & Van de Schoot, R. (2017). Proposal for a five-step method to elicit expert judgment. Frontiers in psychology, 8, 2110. https://doi.org/10.3389/fpsyg.2017.02110.*	
	12:00 – 13:00	Lunch		
	13:00 – 16:00	Computer lab	This afternoon there will be the opportunity to analyze your own data with the methods discussed during the course and ask questions. If you do not have suitable data to bring, we will provide you with a data set and research questions to practice.	

For information about the Social Programme, please have a look at the last page of this document or visit the Utrecht Summer School website!