Introduction to Bayesian Data Analysis
Lecture 0

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What this course is about

- Statistical data analysis using Bayesian methods
- Duration: Four weeks (5-10 hours workload)
- Short lectures followed by quizzes and exercises
- A final exam (if you want an official certificate of completion).

Who is this course for?

This course is for you if

- You are familiar with the programming language R
- You have done some statistical data analysis before, e.g., standard frequentist t-tests and linear models
- You know basic arithmetic and very basic set theory and probability theory
- You want to learn how to use modern computational tools for doing Bayesian modeling.

A can-do mindset is assumed!

- See this video on developing the right mindset for studying statistics: shorturl.at/cFNQT
- Read this blog post I wrote: shorturl.at/IX278

What will you learn in this course?

- Foundational ideas about probability distributions and random variables
- Bayes' rule and its application in simple data analysis problems
- Computational approaches to analyzing more complex data
- Basic usage of the probabilistic programming language Stan (via the front-end brms)
- The basics of linear models and linear mixed models.

This course will provide the foundation for more advanced topics in statistical modeling that also use a Bayesian approach.

Accompanying textbook

I will cover the material in the first four chapters (and part of chapter 5) of this book:

> Bruno Nicenboim, Daniel J. Schad, and Shravan Vasishth. Introduction to Bayesian Data Analysis for Cognitive Science. 2022. Under contract with Chapman and Hall/CRC Statistics in the Social and Behavioral Sciences Series.

- You will get the most out of this course if you read one chapter each week as the course progresses
- Read the book online here: https://vasishth.github.io/bayescogsci/book/
- Be sure to check out the remaining chapters in the book after this course is over ;)

Preparation for this course: Install the relevant software

As preparation, please install

- R and RStudio
- All the libraries listed in the textbook: https://vasishth.github.io/bayescogsci/book/software-needed.html
- Optional: Familiarize yourself with R Markdown to do literate programming and to write reproducible code

Some useful references

- R for Data Science: https://r4ds.had.co.nz/
- R Markdown: https://bookdown.org/yihui/rmarkdown/
- Stan home page: mc-stan.org
- brms home page: https://paul-buerkner.github.io/brms/

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