Advanced Bayesian Methods:
Theory and Applications in R

About the Course

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Goals of this Course

Advanced Bayesian Methods: This course aims to explore advanced Bayesian regression models, ranging from simple linear models to complex structured additive distributional regression models.

Conceptual Understanding: Participants will gain insight into the core concepts of complex Bayesian regression modeling, establishing a solid foundation for advanced statistical analysis.

Practical Application: Through hands-on exercises and real-world examples using R, participants will learn how to practically apply advanced Bayesian modelling techniques, bridging theory with practice.

- Use of flexible methods for estimating smooth functions.
- Modeling complex interactions, space-time, etc.
- Applying advanced algorithms for efficient computation and analysis.
- Probabilistic forecasting challenge.

Outline

Day 1

1. Principles of Bayesian Inference
2. Markov Chain Monte Carlo Simulations
3. Monitoring Mixing and Convergence
4. Posterior Summaries
5. Penalized Spline Smoothing
6. A Generic Basis Function Framework

Day 2

7. Spatial Smoothing
8. GAMLSS
9. Model Checking
10. Families
11. Big Data and Variable Selection
12. Machine Learning

Outline

Day 1 Schedule

09:30–10:00	Coffee
10:00–11:00	Lecture 1–2
11:00–11:15	Coffee Break
11:15–12:00	Lecture 3–4
12:00–13:00	Lunch
13:00–14:30	Practicals 1–4
14:30–15:30	Lectures 5–6
15:30–16:45	Coffee Break
16:45–?	Practicals 5–6

Day 2 Schedule

09:00–10:30	Lecture 7–9
	Forecasting Challenge
10:30–10:45	Coffee Break
10:45–12:00	Practicals 7–9
	Forecasting Challenge
12:00–13:00	Lunch
13:00–15:00	Lecture 10–12
15:00–15:15	Coffee Break
15:15–16:30	Forecasting Challenge