

13th Eawag Summer School in Environmental Systems Analysis 2022

13.6.2022

Lecturers: Carlo Albert (CA), Peter Reichert (PR), Andreas Scheidegger (AS), Dmitri Kavetski (DK), Marco Baity Jesi (MBJ), Marvin Höge (MH).

Practice sessions and support in R: Emanuele Francazi (EF), Ambuj Sriwastava (AmS), Jonas Wydler (JW).

Sunday, June 19: Optional Preparatory Course

10:30 - 11:30	lecture	AS	Review of probability theory
13:00 - 14:00	lecture	JW	Review of the R programming language
14:30 - 16:00	practice	JW	Exercises

Monday, June 20 : Probabilistic Models

08:45 - 09:00	lecture	CA	Introduction to the Course
09:00 - 09:45	lecture	PR	Probabilistic models and likelihood functions
09:45 - 10:15	discussion	CA, all	Introduction and expectations of participants
10:45 - 11:30	lecture	AS	Sensitivity analysis
11:45 - 12:30	lecture	CA	Monte Carlo simulation
14:00 - 17:00	practice	MH, all	Practice of likelihood functions and sensitivity analysis, ex.1
17:00 - 17:30	discussion	MH	Discussion of exercises
18:00 - 21:00	barbecue	all	<i>At the river</i>

Tuesday, June 21 : Introduction to Bayesian Analysis

08:30 - 09:15	lecture	DK	Simple Bayesian schemes
09:30 - 10:15	lecture	PR	Concepts of Bayesian analysis
10:45 - 11:30	lecture	CA	Bayesian computation with Monte Carlo methods
11:45 - 12:30	lecture	DK	Improving models using posterior diagnostics
12:30 - 13:30	guided tour	M.Bürgi	<i>Guided tour through the building and to the river</i>
14:30 - 17:00	practice	EF, all	Practice of elementary Bayesian inference, ex. 2
17:00 - 17:30	discussion	EF	Discussion of exercises

Wednesday, June 22 : Advanced Bayesian Computation

08:30 - 09:15	lecture	DK	Identifiability analysis
09:30 - 10:15	lecture	CA	Advanced Bayesian algorithms
10:45 - 11:30	lecture	AS/PR	Inference with hierarchical models
11:45 - 12:30	lecture	MBJ	Variational Bayes
14:00 - 17:00	practice	EF, all	Practice of Bayesian inference / advanced methods, ex. 3
17:00 - 17:30	discussion	EF	Discussion of exercises

Thursday, June 23 : Applications and Alternative Methods I

08:30 - 09:00	lecture	DK	Optimization techniques
09:15 - 09:45	Lecture	CA	Approximate Bayes computation (ABC)
10:00 - 10:30	lecture	MH	Bayesian model selection
10:45 - 12:30	discussion	all	Discussion of problems of the participants
13:45 - 14:00	course picture		<i>Outside or in the atrium, depending on the weather</i>

			FC-C24	FC-C20
14:00 - 15:00	practice	all	Ex. 4: Inference w. hierarchical models (AmS)	Repetition (AS) / problems of participants
15:00 - 16:00	practice	all	Ex. 5: ABC (MH)	
16:00 - 17:00	practice	all	Ex. 6 : Variational Bayes (MBJ)	

Friday, June 24 : Applications and Alternative Methods II

08:30 - 09:15	lecture	PR	Stochastic models in hydrology and ecology
09:30 - 10:15	lecture	DK	Hydrological modeling, uncertainty and hypothesis testing
10:45 - 11:15	discussion	all	Discussion of problems of the participants
11:30 - 12:00	discussion	AS	Summary of the course
12:00 - 12:30	discussion	all	Feedback to the course
14:30 - 16:30	practice	all	Practice of Bayesian inference

Lectures and practice sessions will take place in FC-C20, lunch will be provided in the restaurant downstairs.