15th Eawag Summer School in Environmental Systems Analysis 2024 (preliminary)

9.01.2024

Lecturers: Carlo Albert (CA), Andreas Scheidegger (AS), Dmitri Kavetski (DK), Marco Baity Jesi (MBJ), Marvin Höge (MH) and Peter Reichert (PR).
Practice sessions: Emanuele Francazi (EF), Alberto Bassi (AB), Cheng Chen (CC), Helen Moor (HM).

Sunday, June 9: Optional Preparatory Course

14:00 - 15:00	lecture	AS	**Review of probability theory**
15:15 - 15:30		AS	**Introduction to exercises**
15:30 - 17:00	practice	CC, all	Exercises

Monday, June 10 : Probabilistic Models

08:45 - 09:00		CA	**Introduction to the Course**
09:00 - 09:45	lecture	CA	**Probabilistic modelling**
09:45 - 10:15		CA, all	Introduction and expectations of participants
10:45 - 11:15	lecture	AS	**Sensitivity analysis and Monte Carlo simulation**
11:30 - 12:15	lecture	AS	**Likelihood functions**
14:00 - 15:00	*Lab tour*		
15:00 - 17:00	practice	AB, all	Practice of likelihood functions and sensitivity analysis
17:00 - 17:30	discussion	AB	Discussion of exercises
18:00 - 21:00	*barbecue*	*all*	*At the lake*

Tuesday, June 11 : Introduction to Bayesian Analysis

08:30 - 09:15	lecture	DK	**Illustration of Bayesian inference**
09:30 - 10:15	lecture	AS	**Concepts of Bayesian inference**
10:45 - 11:30	lecture	CA	**Bayesian computation with Monte Carlo methods**
11:45 - 12:30	lecture	DK	**Improving models using posterior diagnostics**
14:00 - 17:00	practice	EF, all	Practice of elementary Bayesian inference
17:00 - 17:30	discussion	EF	Discussion of exercises

Wednesday, June 12 : Advanced Bayesian Computation

08:30 - 09:15	lecture	DK	**Identifiability analysis**
09:30 - 10:15	lecture	CA	**Advanced Bayesian inference algorithms**
10:45 - 11:30	lecture	MH	**Bayesian model selection**
11:45 - 12:30	lecture	MBJ	**Machine Learning approaches to Bayesian inference**
14:00 - 17:00	practice	EF, all	Practice of Bayesian inference / advanced methods
17:00 - 17:30	discussion	EF	Discussion of exercises

Thursday, June 13 : Triggs and Gäggs

08:30 - 09:00	lecture	DK	**Optimization techniques**
09:15 - 09:45	lecture	CA	**Emulators**
10:00 - 10:30	lecture	AS	**Probabilistic programming languages**
10:45 - 12:30	discussion	all	**Discussion of problems of the participants**

			Room 1	Room 2
14:00 - 15:00	lecture/practice	HM	Inference with hierarchical models	Repetition (AS) / problems of participants
15:00 - 16:00	lecture/practice	CA	ABC inference for stochastic models	
16:00 - 17:00	lecture/practice	MBJ	Variational Bayes: Applications	

Friday, June 14 : Applications in Ecology and Hydrology

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	all	**Summary of the course**
12:00 - 12:30	discussion	all	**Feedback to the course**
14:30 - 16:30	cleaning	all	

Link to the exercises: https://www.eawag.ch/summerschool/exercises