

Summer School 2022

Data Assimilation, Computational Aspects and Application to Hydrology

Ecole Nationale d'Ingénieurs de Tunis, ENIT. Campus Universitaire, Tunis Al-Manar

23 – 30 June 2022

Application deadline: 15 June 2022/ Registration deadline: 23 June 2022

It is well known that atmospheric and oceanic sciences constitute an excellent interdisciplinary example where mathematics physics, statistics, numerical methods and scientific computing meet. This has led to the development of methods to improve weather/climate forecasting exemplified by data assimilation. Data assimilation is a powerful tool that merge models and observations in an optimal way to achieve better estimates of the system state.

Data assimilation was developed initially to get optimal initial conditions used by the numerical weather prediction model in weather forecasting. Today data assimilation is used for various purposes such as optimization, parametrization and stochastic simulation, and is applied in various fields including numerical weather prediction, oceanography, coastal sediment transport, hydrology, and space.

The summer school will present the historical development of data assimilation, and discuss the various types of data assimilation including 3-dimensional and 4-dimensional data assimilation (3d-Var and 4D-Var). The course will be composed of three main topics, namely (i) probabilistic background, (ii) basic statistical modelling and introduction to Markov Chain Monte-Carlo (MCMC), and (iii) data assimilation.

Course outline

Course 1: Basic statistics and probability concepts (A. Hannachi, Stockholm University)

Course 2: Time series modelling (A. Hannachi)

Course 3: Parameter estimation, Bayesian concepts and MCMC (A. Hannachi,)

Course 4: Data assimilation (A. Hannachi)

Scientific Committee members

Z. Bargaoui, ENIT, Tunisi, Tunisia email: zoubeida.bargaoui@enit.utm.tn

A. Hannachi, MISU, Stockholm, Sweden email: a.hannachi@misu.su.se

R. Ouachani, Higher Institute of Transport and Logistics, University of Sousse, Sousse, Tunisia
email: rim.ouachani@istls.u-sousse.tn

Program :

Course n°	Course title	Lecturer	
Course 1	Basic statistics and probability concepts	A. Hannachi	
Course 2	Stationary time series	A. Hannachi	
Course 3	Bayesian method and MCMC, with application to extreme events.	A. Hannachi	
Course 4	A. Overview of data assimilation B. Optimal interpolation and 3D-Var C. 4D-Var D. Sequential DA and Kalman filter	A. Hannachi	
Day	10:00- 12:00	12:00 – 13:00 Lunch break	13:00- 16:30 (30 min break at 14:30)
Thu 23/6	Probability concepts, stationary time series	---	ARMA models - Tutorial & applications
Fri 24/6	Bayesian methods & MCMC	---	Tutorial & applications
Sat 25/6	Trip to a dam site	---	
Mon 27/6	Overview of data assimilation	---	3D-Var & optimal interpolation (OI)
Tue 28/6	Formulation of 4D-Var & cost function	---	Gradient and adjoint method
Wed 29/6	Interpretation of 4D-Var	---	Computational aspects
Thu 30/6	Sequential DA & Kalman filter	---	Tutorial & applications

Venue and Accommodation

The summer school will take place at the National School of Engineering – ENIT

Registration

Deadline for the registration

Contact anyone of the scientific committee. You will receive an acceptance confirmation.

1. After confirmation, registration fees are to be paid through bank transfer to :

ENIT Ecole Nationale d'ingénieurs de Tunis

RIB : 17001.00000.00061.74820

SWIFT : LPTNTNTT

IBAN : TN59 17001000000006174820

Code PIC : 997876637

Matricule fiscal : ENIT 30.333L

Registration fee: 500 TND (bank transfer or order form). Deadline: **23 June 2022**

Registration fees cover conferences and lectures attendance.

2. You will receive a final registration notice after the registration is processed.