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ADVANCED COURSE OFFER

1 (2)

2010-01-11

Uncertainty in Environmental Modelling, 7–16 June 2010

PhD Course (5 + 5 optional HE [higher education] credits/högskolepoäng)

By Professor Keith Beven

Lancaster University and Uppsala University

This course was originally given while Keith Beven spent the academic year 2006/07 in Uppsala as *Konung Carl XVI Gustafs Gästprofessor i Miljövetenskap*. It was given a third time in 2009. All three courses were filled up and several students expressed their interest in attending the same course at a later time. I am now happy to announce that Professor Beven will offer the course a fourth time in Uppsala, again as an intensive course (with a follow-up meeting at a date to be agreed).

The course will be limited to 20 students and if more register, we will allocate priority places to Uppsala University students and thereafter to those who apply first (though we reserve the right to ensure a cross-disciplinary mix of students). Registrations will be accepted until 1 April 2010.

If you are interested to attend the course, please send the following information to Sven.Halldin@hyd.uu.se.

Name:

University:

Department:

Supervisor:

Subject of thesis work:

Brief details of model to be used in project work:

Yours,

Sven Halldin



2010-01-11

Course layout

The course provides an introduction to the sources and assessment of uncertainty in the predictions of environmental models. We will meet for six extended sessions, consisting of a series of lectures, practical sessions, discussion sessions, and presentations. The spacing of the initial sessions is intended to allow discussion material to be read and absorbed. The course is based on Keith's book *Environmental Modelling: An Uncertain Future: Routledge, 2008*, which the student is expected to have. A full reading list with complementary articles will be sent to registered students. The material will be illustrated with examples taken from catchment hydrology, groundwater, hydraulics, boundary-layer meteorology, geochemistry, and ecology.

Each student is expected to define an experimental design for an uncertainty analysis on their own model / data set. Practical sessions will illustrate how to set up models for Monte-Carlo simulation and to analyse the results using different uncertainty estimation methods.

Students will be requested to actively follow all lectures, participate in extended discussion sessions, and to make an oral presentation of a project application in order to pass the first part, worth 5 HE credits (högskolepoäng). Students will have the opportunity to carry out further work on their project and to produce a full paper describing the results. Such a continuation will be assessed as another 5 HE credits (högskolepoäng) if an acceptable paper is completed.

All lectures and discussions will be held at the Department of Earth Sciences on Villavägen 16 in Uppsala

Tentative programme

Session 1: Monday 7 June

Lecture: Sources of uncertainty, optimisation and multi-criteria evaluation, differentiating forecasting and simulation, and setting up models for Monte-Carlo simulation.

Short presentations: background of each student and models of interest.

Discussion papers: Sources of Uncertainty, Pareto optimisation

Session 2: Wednesday 9 June

Lecture: Sensitivity analysis and Forward multi-criteria evaluation, sampling the model space.

Discussion papers: Generalised Sensitivity Analysis

Session 3: Friday 11 June

Lecture: The Bayesian Paradigm and MCMC methods

Short presentations: reports on progress with model results

Discussion papers: Application of Bayes Equation; Dealing with Model Inadequacy

Session 4: Monday 14 June

Lecture: The GLUE Paradigm

Discussion papers: Applications of GLUE

Session 5: Wednesday 16 June

Lecture: Uncertainty in Decision Making / InfoGap methods

Short presentations: reports on progress on experimental design

Discussion papers: Applications to groundwater pollution and flood risk management

Session 6: Follow-up meeting (later date to be agreed upon)

Presentations (students continuing with second part of the course) of full papers on project results