

Course overview

This five-day course will be hosted by John Doherty, author of PEST. He will be assisted in practical sessions by Francesca Lotti of SYMPLE/Kataclima.

Attendees will learn how to process site data in decision-relevant ways using groundwater simulation. The course will cover traditional ways of model history-matching and uncertainty analysis using discrete parameters, distributed parameters, and ensembles. It will also discuss and demonstrate new ways of decision-pertinent, model-based processing of site data such as data space inversion, hierarchical inversion, use of non-stationary geostatistics, and innovative "non-centred parameterization" using pilot points.

There is a lot to cover. Nevertheless our desire is to be flexible. Some of the material is covered in previous PEST courses, to which attendees will be given access. If attendees wish, this can open up time for discussion of issues that are important to them. These issues may include development of modelling, parameterization and history-matching strategies that are best for their own contexts, or how to decide what should be included or omitted from a model in order to enhance its decision-support utility.

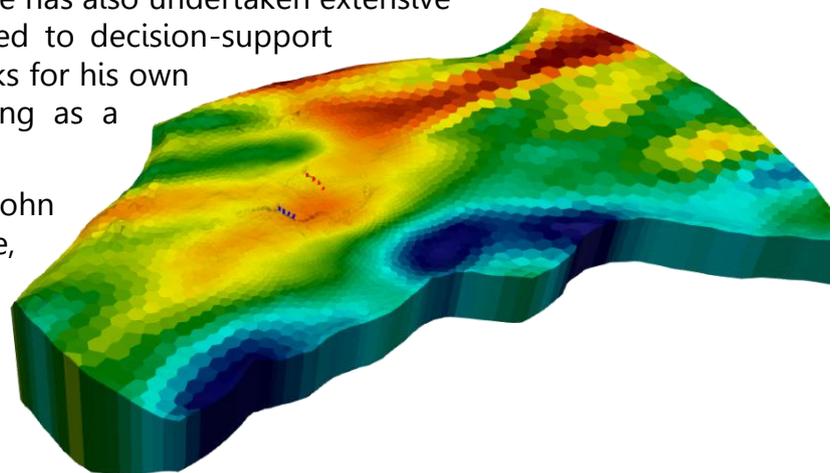
If they need advice on using PEST/PEST++ or associated utility software at their own sites, attendees will have access to John once they return home after the course.

John Doherty

John is the author of [PEST and PEST-support utility software](#). Until recently, he also contributed heavily to GMDSI, an industry-sponsored initiative to boost awareness and education on the principles and practice of decision-support groundwater modelling; see the [GMDSI](#) web page and its [YouTube channel](#).

Over his career of nearly 50 years, John has worked as both a geophysicist and a modeller in the private, public and Tertiary sectors. He has also undertaken extensive research and development in topics related to decision-support environmental modeling. He presently works for his own company, Watermark Numerical Computing as a consultant.

Additional [free software](#) developed by John can be found on the SYMPLE website, together with other new [PEST-related services](#).



Course Programme

Preliminary Information

The programme can be altered in accordance with attendee's wishes. Many topics are covered in previous courses, which have been recorded. Attendees will be given access to these recordings before the Vetralla course.

- Instructions for installing the software and accessing the e-learning platform.
- A test model is provided to check that everything runs fine.
- What to read to get a "foretaste" of issues related to model parameterization.
- Videos and tutorials to build and calibrate a simple model using ModelMuse.
- Access to the SYMPLE Chat for quick support.

September 28 (9 am-1 pm; 2-6 pm)

- Introduction and getting to know each other.
- What is model calibration?
- What does Bayes equation tell us about decision-support modelling?
- How to live with parameter nonuniqueness.
- "The prior" and its importance for regularization and uncertainty analysis.
- What if you don't know "the prior"?

September 29 (9 am-1 pm; 2-6 pm)

- Tikhonov regularization.
- Insights from singular value decomposition.
- Resolution: the relationship between estimated parameters and real-world hydraulic properties.
- Pilot points as a parameterization device.

September 30 (9 am-1 pm; 2-6 pm)

- Principles of uncertainty analysis.
- Basic geostatistics.
- Nonstationary geostatistics.
- Generation of stochastic parameter fields.
- Adjustment of stochastic parameter fields using an ensemble smoother.
- Ensemble methods – what to watch out for when using them.

October 1 (9 am-1 pm; 2-6 pm)

- Linear and nonlinear uncertainty and data worth analysis.
- Uncertainty in uncertainty; hierarchical inversion.
- Data space inversion.
- Ensemble space inversion.
- New ways to use pilot points.
- Model-based predictive hypothesis-testing.

October 2 (9 am-2 pm)

Topics covered on this day will be guided by attendees' wishes. They may include:

- "Group therapy": as we collectively discuss attendees individual modelling problems;
- Low enthalpy geothermal modelling;
- Use of areal electromagnetics to inform model construction and history-matching;
- Optimization under uncertainty;
- Rapid, stochastic capture zone analysis;
- Input protocols for MODFLOW 6;
- Use of a Voronoi grid;
- Benefits and drawbacks of numerical model complexity.

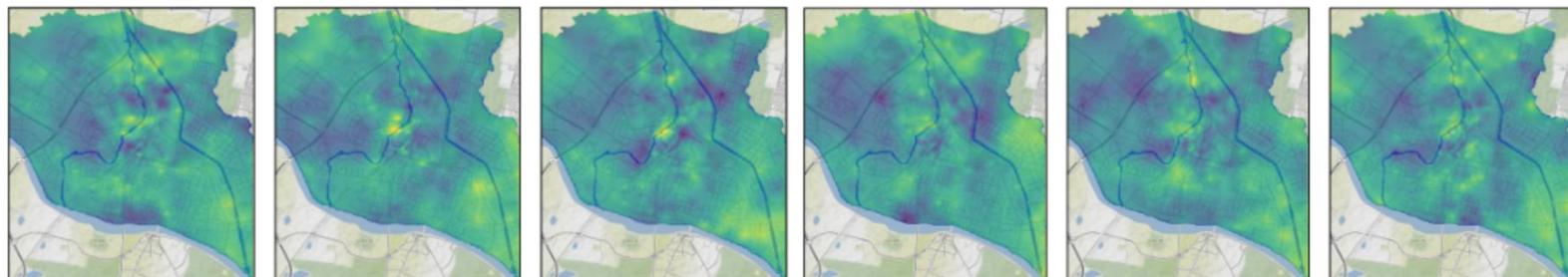
On request - On-line sessions

Q&A sessions

Optionally, additional post-course on-line sessions can be organized to discuss questions and issues that you may have after you have thought about the course for a while.



Online & Onsite: **September 28th -October 2nd, 2026** Vetralla, Italy



What is included

- Access to live lessons (both in the on-site classroom and remotely)
- Software and installation instructions provided before the course
- Access to our [e-learning platform](#) to watch again the recorded lessons with no limit of time
- Material to carry out the exercises and additional video-lessons
- *APC credits* for Italian Geologists
- Coffee breaks and light lunches
- Tour of the Medieval town of Viterbo and its Thermal hot springs

Remote/Live Attendance

The course can be attended blended (online and onsite sessions) or completely by remote viewing. Lessons are recorded. The venue is located in [Vetralla \(VT\)](#), Italy (60 km from Rome).

A limited number of rooms is available at the SYMPLE Guesthouse – priority will be given to participants who register earlier.

Costs

SYMPLE is an Accredited Training Organization, VAT is not due (art. 10 DPR 633/72).

- **Regular: 1000 €**
- **IAH/SGI: 800 €**
- **Students/ECHN: 500 €**
- Scholarships available for the attendees of the current edition of the [SYMPLE School](#)
- Installments available

We live in a wonderful place, surrounded by wild woods and near the volcanic Lake Vico... For accommodation suggestions and "how to get there" advice, just ask us!



Other opportunities to "meet" PEST

- See [roadmaps](#), [videos](#), [webinars](#), [tutorials](#) and [frequently asked questions](#) that are accessible for free through the [PEST web pages](#).
- Further training material is available on the [GMDSI web pages](#).
- Visit the [Modelling section](#) of the SYMPLE website for additional free software and PEST related services.



[Registration link](#) 

Register preferably before July 30, 2026

Limited onsite seats