

PhD program in Civil Engineering – *Structural and Geotechnical Engineering*

Prof. Jean Vaunat

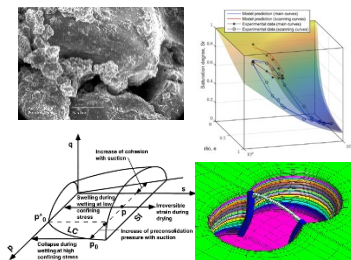
Department of Civil and Environmental Engineering- Universitat Politècnica de Catalunya

Lectures on

Modelling of soil behaviour for conventional and non-conventional geotechnical applications

From 7th to 23rd of April 2025 – [Registration link](#) Hybrid meetings: in-person in *Aula multimediale*, Edificio di Ingegneria Civile, via Politecnico 1, 00133, Roma, and online on the MS Teams platform

The course will give the phenomenological and theoretical bases of constitutive models for soils and soft rocks as well as their extension to unsaturated conditions and environmental processes in presence of heat and phase changes. Models will be illustrated on Boundary Values problems representative of distinct conventional and non-conventional geotechnical issues and solved with an FEM code able to perform analysis of coupled thermo-hydro-mechanical (THM) phenomena in porous media. The course is targeted at PhD students in Civil and Environmental Engineering.



Jean Vaunat is Professor at the Technical University of Catalonia, where he delivers undergraduate and graduate courses in Geotechnical Engineering, Constitutive and Numerical Modelling and Unsaturated Soils Mechanics. His research works cover aspects in the fields of unsaturated soils, numerical and constitutive modelling, thermo-hydro-mechanical (THM) coupled problems, elastoplasticity and porous media. Besides his participation in the development of reference constitutive models and consolidated numerical tools, he is deeply involved in their application to conventional and non-conventional geotechnical issues: deep storage of exothermic waste in geological formations, soil-vegetation-atmosphere interactions, phases changes in soils (soil freezing, methane hydrates) and hydro-mechanical response of unsaturated soils.

Program:

1	07/4/2025	Fundamentals for constitutive modelling (9:00am-13:00pm)
2	08/4/2025	Friction-based models (10:00am-13:00pm)
3	09/4/2025	Critical state models for reconstituted and natural soils (9:00am-13:00pm)
4	10/4/2025	Models for unsaturated soils (9:00am-13:00pm) Homework discussion (15:00pm-18:00pm)
5	11/4/2025	Microstructure and other environmental variables (9:00am-13:00pm)
6	23/4/2025	Case study discussion (10:00am-13:00pm)

Please register
at this [link](#)



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Participants attending online will receive the link to the meetings via email after registration.