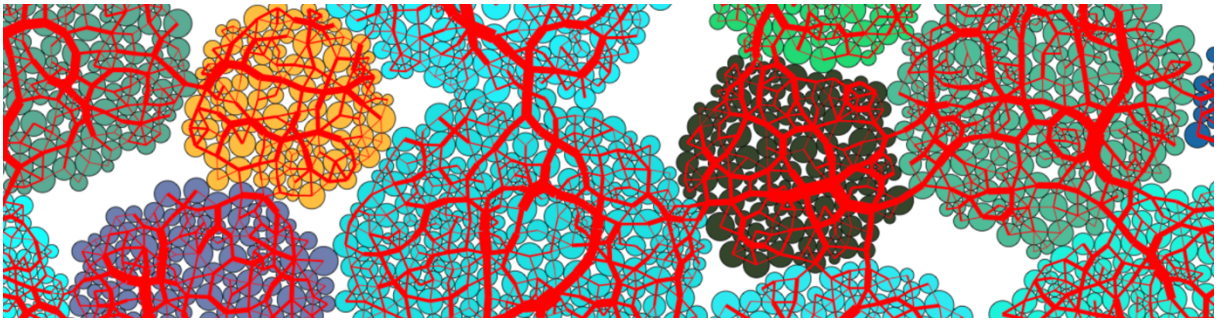

Advanced virtual course on

Modeling Granular Processes for Energy and Environment (GPE)

Granular materials such as soils, powders and pharmaceutical products constitute the most abundant form of solid matter on Earth. Composed of a large number of grains interacting via frictional contacts and/or cohesive forces, they defy the standard scheme of classification in terms of solid, liquid, and gas. Their complex behavior has been at the focus of contemporary research in physics, mechanics, chemistry and geosciences. Today, the models and methods developed for two decades in this field represent a vast potential for application to technological and societal challenges related to energy, materials and environment.

The aim of this course is to provide a general introduction to both classical and modern concepts, models and methods developed for granular materials with a view of application to research issues in energy and environment. To bridge the gap between basic concepts and applications, several environmental granular processes and the related research issues are covered. As numerical simulations play a crucial role in modern research on granular processes, several methods will be introduced. Furthermore, an important part of the course will be focused on the multiscale modeling of granular materials from particle interactions and particle-scale inhomogeneities up to their collective and rheological behavior at the macroscopic scale.

This course will be of particular interest to graduate students (Master, PhD) and researchers in physics, mechanics, powder technology, soil mechanics, geosciences and environmental sciences, who wish to acquire a general understanding of the physics of granular materials and granular processes in nature and technology. All sessions will be virtual and the participants will get credits for their participation (required for doctoral schools). Each session covers a stand-alone course on a specific topic, making it possible to follow selected courses. All courses are free of charge, but registration is required following the link: https://gpe.sciencesconf.org.

For further information, please visit the website of the course or email the organizers. This course is sponsored by Labex NUMEV, University of Montpellier.

Farhang Radjai, franck.radjai@umontpellier.fr

Katerina Ioannidou aikaterini.ioannidou@umontpellier.fr

Program

What are granular materials?
Farhang Radjai, LMGC, University of Montpellier
25/02/2021, 10:00-12:00 CET

Basic features of soil mechanics and the granular micromechanical approach (1)
Jean-Noël Roux, Ifsttar, Laboratoire Navier
25/02/2021, 14:00-16:00 CET

Discrete Element Method (DEM) for granular materials
Vincent Richefeu, 3SR, Alpes Grenoble University
04/03/2021, 10:00-12:00 CET

Basic features of soil mechanics and the granular micromechanical approach (2)
Jean-Noël Roux, Ifsttar, Navier Laboratory
04/03/2021, 14:00-16:00 CET

Suspensions and unsaturated media (1)
Serge Mora, LMGC, University of Montpellier
11/03/2021, 10:00-12:00 CET

Continuum modeling for granular materials
Saeid Nezamabadi, LMGC, University of Montpellier
11/03/2021, 14:00-16:00 CET

Damage and Fracture mechanics
Djimédo Kondo, Sorbonne University, D'Alembert Institute
18/03/2021, 10:00-12:00 CET

Powder Compaction for Pharmaceutical Tabletting
Tahmer Sharkawi, Institut Charles Gerhardt Montpellier
18/03/2021, 14:00-16:00 CET

Porous materials and homogenization methods
Jolanta Lewandowska, LMGC, University of Montpellier
25/03/2021, 10:00-12:00 CET

Lattice Boltzmann Method (LBM)
Jean-Yves Delenne, INRAE – IATE
25/03/2021, 14:00-12:00 CET

Granular surface processes in geology and natural hazards
Alfredo Taboada, Géosciences Montpellier
01/04/2021, 10:00-12:00 CET

Granular materials across the scales: Multiscale approach of failure in geomaterials
François Nicot, INRAE, Grenoble
01/04/2021, 14:00-16:00 CET

Physics of sand beach morphodynamics
Frédéric Bouchette, Montpellier Geosciences
08/04/2021, 10:00-12:00 CET

Molecular Dynamics and Monte Carlo methods, Thermodynamics of materials (1)
Katérina Ioannidou, CNRS - LMGC
08/04/2021, 14:00-16:00 CET

Suspensions and unsaturated media (2)
Serge Mora, LMGC, University of Montpellier
15/04/2021, 10:00-12:00 CET

Molecular Dynamics and Monte Carlo methods, Thermodynamics of materials (2)
Katérina Ioannidou, CNRS - LMGC
15/04/2021, 14:00-16:00 CET