Course offered for the PhD program
in Civil, Chemical and Environmental Engineering
a.y. 2023/2024 (XXXIX cycle)
(course is open for participation of students from other PhD cycles or programs)

1. Title
Physics of granular suspensions with applications to geophysical flows

2. Course Description
The course is conceived to provide PhD students with fundamental knowledge on the mechanics of granular suspensions as well as on the mathematical and numerical techniques that can be adopted to investigate geophysical flows. To this end, three formidably complex problems (sediment transport, flow-like landslide inception and gravity currents) are considered. A brief excursus into the physics of Brownian suspensions completes the course. The students will find a thorough combination of elements of fluid and solid mechanics, rheology, geotechnics, geomorphology, fluvial and coastal hydraulics. First, the dynamics of granular suspension is introduced from the mathematical viewpoint, focusing on issues that characterise geophysical flows such as turbulence, the effects of inter-particle contacts and strong velocity gradients. Then, different models that were successfully used to investigate the mechanics of granular suspension in environmental flows are presented.
Further information on the course are available in the dedicated web page:
https://sway.office.com/SqcYQ7RBn0QDmEoN?ref=Link

3. Course Organization
The course consists of frontal lectures.
The students are invited to prepare the brief presentation of a problem either dealing with their own research activity or taken from the literature, which involves granular suspensions.

4. Teacher
Marco Mazzuoli (marco.mazzuoli@unige.it)

5. Duration and credits
Around 20 hours, 4 CFU.

6. Activation mode and teaching period
Period: a single week of July 2024 (the dates will be specified in the dedicated webpage)

7. Deadline for registration
1st of May 2023.
Please register by filling in the form at the following URL:
https://forms.office.com/e/MBRekNrMMZ

8. Final exam
A “workshop” concludes the course where the presentations are individually given by the students.