

**Course offered for the PhD program
in Civil, Chemical and Environmental Engineering
Curriculum in Fluid Dynamics and Environmental Engineering
a.y. 2022/2023**

(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, civil, chemical and coastal engineering. 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.

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 20h, 4 CFU.

6. Teaching period

Period: September-October 2023

(4-6 hours per week)

7. Deadline for registration

1st of July 2023.

Please register at the following URL: <https://forms.office.com/e/MBRekNrMMZ>

(otherwise, send a message to the Teacher by email)

8. Final exam

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