

**Course offered by the PhD program
in Civil, Chemical and Environmental Engineering
a.y. 2025/2026 (41 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 Objectives and 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, fluvial and coastal hydraulics and morphodynamics. 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.cloud.microsoft/PDgcik7gxXwFLjgq?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

20 hours, 4 CFU.

6. Activation mode and teaching period

Period: 30th June – 3rd July 2026 (4 days)

7. Deadline for registration

1st of May 2026.

Please register by filling in the form at the following URL:

<https://forms.office.com/e/dvXppmeu7A>

8. Final exam

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