

**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

Innovation in Unit Operations

2. Course Description

The course aims at providing notions to the future PhD students on innovative processes based on supercritical fluids.

The course will include the following topics:

- Classic operations and their limits of selectivity, pollution from organic solvents. Solvent-less operations);
- Properties of pressurized systems in conditions close to the critical point.
- Supercritical solid-fluid extraction.
- Supercritical fluid-fluid extraction (fractionation).
- Classical crystallization and its limits: oversaturation rate, control of particle size and particle size distribution. Comparison with supercritical crystallization processes.
- Encapsulation and delivery of active molecules. Micro and nanoporous materials. microcapsules and biopolymeric microspheres. Description of the limits and advantages of the conventional production processes and of the supercritical assisted techniques.
- Production of micro and nanoporous materials with phase inversion techniques assisted by supercritical fluids and by supercritical drying of hydrogels.

3. Course Organization

The course, organized into a single module, will consist of classroom lessons.

4. Teacher

The course teacher will be Prof. Roberta Campardelli.

5. Duration and credits

The course (15 hours) will consist of 5 lessons, 3 hours each, for a total of 3 credits.

6. Activation mode and teaching period

The course will be held yearly if at least two students will be registered by simple contact with the teacher by email. The course will be held during the period June-July 2026. The exact dates of the lessons will be confirmed about one month before the beginning of the course.

7. Deadline for registration

Registration to the course must be made before December 20th, 2025. Students are requested to inform the teacher by e-mail roberta.campardelli@unige.it about their registration.

8. Final exam

The examination test will consist of a final discussion on a topic defined with the teacher.