

**Course offered for 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

Numerical weather prediction modeling: theory and applications

2. Course Objectives and Description

The course will offer a comprehensive overview of numerical modeling in atmospheric science, encompassing global models as well as limited area models. It will introduce the Weather Research and Forecasting (WRF) numerical model, renowned for its cutting-edge capabilities in atmospheric modeling. The course will utilize WRF for conducting simulations and analyzing both idealized scenarios and real-world case studies.

Through in-class tutorials, participants will learn to prepare diverse simulations by employing different sets of initial and boundary conditions across various spatial domains and resolutions. Additionally, students will gain proficiency in constructing nested domains to generate simulations at exceptionally high resolutions, which are essential for accurately capturing convective phenomena.

3. Course Organization

The course will consist in frontal lectures introducing the numerical weather modeling and practical sessions to setup and run numerical simulations.

4. Teacher

Francesco Ferrari

5. Duration and credits

20 hours / 4 credits

6. Activation mode and teaching period

The course will take place in the period March-May 2026. The schedule will be arranged in agreement with the students.

7. Deadline for registration

Registration via email (francesco.ferrari@unige.it) before the end of January 2026.

8. Final exam

Simulation and analysis of some case studies selected by the student.