

PHD PROGRAMME IN PHYSICS, ASTROPHYSICS, AND APPLIED PHYSICS
UNIVERSITÀ DEGLI STUDI DI MILANO
PhD Cycle 41 (2025-2026)

All lectures will be given in English.

Course title	Experimental methods for the investigation of systems at the nanoscale.
Teacher in charge of the course	Vailati Alberto
List of the teachers of the course	Arosio Paolo, Unimi-Dept. of Physics; paolo.arosio@unimi.it Buscaglia Marco, Unimi-Biometra; marco.buscaglia@unimi.it Carpinetti Marina, Unimi-Dept. of Physics; marina.carpinetti@unimi.it Cialdi Simone, Unimi-Dept. of Physics; simone.cialdi@unimi.it Giavazzi Fabio, Unimi-Biometra; fabio.giavazzi@unimi.it Lenardi Cristina, Unimi-Dept. of Physics; cristina.lenardi@unimi.it Piseri Paolo, Unimi-Dept. of Physics; paolo.piseri@unimi.it Podestà Alessandro, Unimi-Dept. of Physics; alessandro.podesta@unimi.it Siano Mirko, Unimi-Dept. of Physics; mirko.siano@unimi.it Vailati Alberto, Unimi-Dept. of Physics; alberto.vailati@unimi.it Zanchetta Giuliano, Unimi-Biometra; giuliano.zanchetta@unimi.it
Training objectives	The course is focused on the description of experimental methods suitable to manipulate and investigate mesoscopic systems, such as nanostructured materials and interfaces, soft matter, and biological samples. The course is structured as a sequence of self-contained lectures held by specialists in the field. Several lectures are accompanied by the experimental demonstration of the method in the research laboratories.
Prerequisites	Knowledge of Physics and Mathematics at university level. The course is also suitable for students without prior knowledge of the topics discussed.
Detailed course program	Coherent imaging, Mirko Siano Molecular Beams, Paolo Piseri Laser Sources, Simone Cialdi Photoemission Spectroscopy, Cristina Lenardi Nanomagnetism, Paolo Arosio Static light scattering and its applications, Marina Carpinetti Intensity Fluctuation Spectroscopy, Alberto Vailati Fluorescence methods in biophysics, Marco Buscaglia Quantitative Microscopy, Fabio Giavazzi Rheology and micro-rheology, Giuliano Zanchetta Scanning probe microscopies, Alessandro Podestà
Examination modalities	At the end of the teaching each student must present a seminar consisting of a short presentation (20 minutes) focusing on the deepening of one experimental method. The student must identify a reference person among the lecturers and agree a suitable topic for his seminar. The first slide should be dedicated to a very short description of the topic of the research carried on during the PhD. The presentation should then outline the basic physical principles behind the chosen experimental method and discuss in detail one application. Review presentations must be avoided. Instead, the student should dig deeply into the technical details of a specific application. Presentations are evaluated not only from the understanding of the topic reached by the student, but also based on the quality of the exposure, including its organization, clarity and timing. As far as timing is concerned, students are required to fill in the best possible way the 20 minutes at their

	disposal, avoiding excessively long or short presentations (19-21 minutes are fine, while 15 or 25 minutes are not)
Preliminary schedule	Mid-April to end of May Course enrolment deadline: December 27, 2025.