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

All lectures will be given in English.

Course title	Nuclear structure theory: density functional methods in nuclear physics
Teacher in charge of the course	Leoni Silvia
List of the teachers of the course	Colò Gianluca, University of Milan, gianluca.colo@unimi.it
Training objectives	Students will be led to understand and master the most widely used theoretical methods for nuclear structure studies.
Prerequisites	Basic knowledge of nuclear physics.
Detailed course program	• The nucleon-nucleon interaction and the nuclear many-body problem: a survey. • Nuclear structure models with emphasis on Density Functional Theory (DFT). • DFT: the original Hohenberg-Kohn theorem; transferring DFT from electronic systems to nuclei; basics on Skyrme, Gogny and relativistic functionals. • Applications of *static* DFT: ground-state properties (masses, radii, deformations). • Time-dependent DFT and nuclear vibrational states. Giant resonances. • The nuclear equation of state and applications to compact objects (neutron stars). • Further topics: nuclear superfluidity, isospin in nuclear physics, exotic resonances.
Examination modalities	Oral exam
Preliminary schedule	January 2026 Course enrolment deadline: December 27, 2025.