PhD course 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	Advanced topics in astrophysics and plasma physics - Fundamentals of cosmic structure formation
Teacher in charge of the course	Guzzo Luigi
List of the teachers of the course	Guzzo Luigi, Università degli Studi di Milano, luigi.guzzo@unimi.it
Training objectives	Provide the student with an overview of the state of the art in the observations of large-scale structure with galaxy surveys, as one of the pillars of the standard model of cosmology; introduce the theoretical framework for the statistical description of galaxy clustering and the formation of cosmic structure; discuss how to extract estimates of cosmological parameters from observations, evidencing both observational and modelling systematic errors that may affect these results.
Prerequisites	Basic knowledge in astrophysics and Big Bang cosmology is requested. The course is meant to provide the student with the tools to understand modern observations of large-scale structure and their cosmological analysis.
Detailed course program	• Overview of current observations of large-scale structure • Statistical description and theory of structure formation • Deriving cosmological parameters from LSS observations: nonlinear evolution, galaxy bias and redshift-space distortions • Stage IV cosmological surveys: DESI, Euclid and future measurements
Examination modalities	Seminar to members of the cosmology group on a selected topic, to be agreed with the teacher
Preliminary schedule	The course is typically concentrated within 1-2 weeks, in a period to be agreed with the students, ideally in February. Course enrolment deadline: December 27, 2025.