



Direzione Ricerca,
Innovazione e
Internazionalizzazione

**UNIVERSITÀ
DI TORINO**

ID

VP_087_FIS

Visiting Professor Program Academic Year 2025/2026

TEACHING COMMITMENT: 12 hours

COURSE TITLE

Introduction to Path Integrals: Applications to Equilibrium and Off-Equilibrium Statistical Mechanics

TEACHING PERIOD

I semester

SCIENTIFIC AREA

Physics (Statistical Mechanics)

LANGUAGE USED TO TEACH

English

COURSE SUMMARY

This short course seeks to provide an introduction to path integration, beginning with its foundational principles and progressing to an exploration of key techniques, such as instantons and the renormalization group, along with their applications in contemporary research.

Core Topics:

Free particle; Harmonic Oscillator; Instantons and Tunneling in Quantum Mechanics;

Outline of the Renormalization Group method (Ising Model as a case study);

Stochastic Hydrodynamics: applications to Burgers and Pipe Flow Turbulence.

LEARNING OBJECTIVES

Students will learn recent results in statistical mechanics and their application in different fields of physics, including stochastic hydrodynamics and turbulence.

OTHER ACTIVITIES BESIDE THE COURSE

A general seminar will be organized for Master and PhD students.

VISITING PROFESSOR PROFILE

Research experience in modern statistical mechanics, in particular in instanton techniques and application to stochastic hydrodynamics and turbulence theory.

Teaching experience in statistical mechanics at the graduate level.

CONTACT REFERENT

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