UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Statistical Mechanics

**2324-1-F1701Q081**

### Aims

At the end of the course students should be familiar with the basic ideas of Statistical Mechanics such as the statistical approach to the derivation of the equation of states for classical and quantum gases, the theory phases transitions and of critical phenomena.

### Contents

statistical ensembles, derivation of the equation of state for classical and quantum gases, theory phases transitions, critical phenomena and renormalization group.

### Detailed program

Equilibrium and Statistical Mechanics. Statistical ensembles. Liouville theorem.
Microcanonical, Canonical and Grancanonical ensembles. Ideal and Interacting classic gases, the cumulant-expansion. Quantum gases Fermi-Dirac and Bose-Einstein distributions. Phonon and Photon gases.

Phases transitions and critical phenomena. Van-der-waals equation.
Ising model. Landau and Landau-Ginsburg theories. Renormalization Group.

### Prerequisites

## Teaching form

Frontal teaching (42 hours)

## Textbook and teaching resource

Mehran Kardar, Statistical Physics of Particles, Cambridge University Press.
Landau-Lifshitz, Statistical Physics (part I), Elsevier.
Kerson Huang, "Statistical mechanics" John Wiley & Sons.

## Semester

Semester I

## Assessment method

Oral exam concerning the topics discussed during the course. Students can be asked to reproduce in detail the demonstrations seen in class.

## Office hours

Email me to fix an appointment at: sara.pasquetti@unimib.it

## Sustainable Development Goals