UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Principles of Electron Microscopy and Applications to Nanomaterials Research

**2425-116R-M07**

## Title

Principles of Electron Microscopy and Applications to Nanomaterials Research

## Teacher(s)

Prof. Giovanni Maria Vanacore

## Language

English

## Short description

The course aims at providing an introduction to the main techniques of electron microscopy with applications to materials.

The following topics will be discussed:

- Introduction to electron optics: wave-nature of electrons; electron-matter interaction; basic layout of a

microscope.

- Transmission Electron Microscopy (TEM): imaging modes (bright and dark field), diffraction and crystallography; amplitude and phase contrasts in TEM; advanced modes of operation: High- Resolution TEM, magnetic TEM, and Scanning TEM.
- Scanning Electron Microscopy (SEM): layout of a SEM microscope; secondary electron contrast and imaging modes.
- Electron Spectroscopies in TEM/SEM: Electron Energy-Loss Spectroscopy (EELS); Energy Dispersive X-Ray Spectroscopy (EDS); Chathodoluminescence (CL); Auger Electron Spectroscopy (AES).
- TEM/SEM investigation of nanomaterials for electronic, photonic and phononic applications.

## CFU / Hours

1 CFU/ 8 hours

## Teaching period

March 2025

## Sustainable Development Goals

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE