UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Scanning and Transmission Electron Microscopy, Principles and Applications

2526-1-124R005

Title

Scanning and Transmission Electron Microscopy, Principles and Applications

Teacher(s)

Giancarlo Capitani ; Paride Mantecca ; Giovanni Maria Vanacore

Language

English

Short description

Aim of the Course: Scanning and Transmission Electron Microscopy (SEM and TEM, respectively) are powerful techniques for the characterization of materials at a very fine scale. They are potentially of interest for all the scientific fields addressed in this Doctoral Course. Exploiting the different signals produced by the electron matter interaction, information on morphology, structure, and composition of hard and soft materials from the micrometre to the nanometre scale is possible. The course will provide with the principles governing electron microscopy, the sample preparation, and the different operational modes available in modern instruments. Some case studies will

be presented and practical sessions on the instruments installed at the “Piattaforma di Microscopia” di Milano-Bicocca are planned.

Detailed Program

1. Brief history of Electron Microscopy development

2. Electron-matter interaction

3. SEM and TEM sample preparation

4. Methods for bio-Electron Microscopy

5. Secondary (SE) and backscattered (BSE) observations

6. Electron backscattered diffraction (EBSD)

7. Bright field (BF), dark field (DF) and high resolution (HR) imaging

8. Selected area diffraction (SAD) and diffraction tomography (EDT)

9. Energy-dispersive (EDS) and wave-dispersive (WDS) analyses

10. Practical use of SEM and TEM

11.Electron Microscopy limits and pitfalls

Final Evaluation: The final assessment of the course consists of an online test with self-assessable multiple choice questions

CFU / Hours

3 CFU - 30 Hours (12h lecture - 18h laboratory training)

Teaching period

II semester

Sustainable Development Goals