EPFL

MSE-609

# 21Intro Scanning electron microscopy techniques

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| Cursus | Sem. | Type |
|---|---|---|
| Materials Science and Engineering | | Opt. |

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| Language of teaching | English |
| Credits | 1 |
| Session | |
| Exam | Written |
| Workload | 30h |
| **Hours** | **18** |
| Courses | 15 |
| Exercises | 3 |
| **Number of positions** | **16** |

## Frequency

Every 2 years

## Summary

Modern Scanning Electron Microscopes, when combined with focused ion beams (Dual beam FIBs), provide a larger number of multimodal imaging and different analytical methods. The course format consists of introductory lectures, lectures on advanced techniques and practical work.

## Content

The following subjects will be presented during the course:
- Basics of the scanning electron microscopy and focused ion beam instruments (construction principles, signals, interaction with the sample)
- Advanced imaging modes: STEM, low tension microscopy, high vacuum, ion channeling
- Advanced microstructure investigation with EBSD and transmission EBSD orientation mapping (EBSD strain and stress analyses with cross correlation technique)
- Chemical analyses with EDS, WDS and ÎŒ-XRF
- Chemical depth profile with FIB-TOF-SIMS
- Raman spectrometry for phase and strain/stress analyses

The techniques will be explored in small groups on real samples in front of SEMs

## Note

This course is open to participants with a basic background in materials science, mechanical engineering, chemical engineering, micro-technology or physics.

## Keywords

Scanning Electron Microscopy; microanalysis, multimodal imaging, analytical methods, chemical analysis