MSE-704  
3D Electron Microscopy and FIB-Nanotomography  
Cantoni Marco, Navratilova Lucie

**Cursus**  
Materials Science and Engineering  
Type: Opt.

<table>
<thead>
<tr>
<th>Contact language</th>
<th>English</th>
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<tr>
<td>Credits</td>
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<td>Session</td>
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<td>Exam</td>
<td>Project report</td>
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<td>Workload</td>
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<td>Lecture</td>
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<td>Practical work</td>
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**Frequency**  
Every year

**Summary**  
The principles of 3D surface (SEM) reconstruction and its limitations will be explained. 3D volume reconstruction and tomography methods by electron microscopy (SEM/FIB and TEM) will be explained and compared with x-ray tomography.

**Content**  
Physics of the different signals generated by electron beams and focused ion beams.
- Underlying physical principles for the acquisition of data sets for 3D reconstruction: interaction volumes, voxel (3 dimensional “pixel”) size, mechanical stability issues for successful reconstruction.
- Surface reconstruction (SEM), serial (parallel) sectioning (SEM/FIB and TEM), tilt series tomography (TEM)
- Introduction to the use of software packages for 3D surface and volume reconstruction
- Practical session about the 3D surface reconstruction by SEM
- Practical session about 3D volume reconstruction by FIB nano-tomography
- Practical session TEM tomography

**Keywords**  
3D reconstruction, serial sectioning, electron tomography, FIB Nano-tomography, scanning electron microscopy, transmission electron microscopy

**Learning Prerequisites**  
**Recommended courses**  
Background in electron microscopy: electron microscopy lecture 5 sem. Bachelor level or doctoral school SEM&TEM or equivalent

**Assessment methods**  
Project Report

**Resources**
Moodle Link

- https://go.epfl.ch/MSE-704