Summary
The course's objectives are: Learning several advanced methods in experimental physics, and critical reading of experimental papers.

Content
- **Noise and interference:** Their origins, their influence on experimental results, methods for noise and interference reduction
- **Scanning probe microscopy (SPM):** Principles of operation of the scanning tunneling microscope and atomic force microscope, Advanced scanning microscopy techniques, applications
- **Optical spectroscopies:** The elements of a modern spectroscopy system, methods of spectral dispersion and their advantages, optical detectors
- **Electron microscopy:** Transmission and scanning microscopes, their principles of operation, observation techniques, uses ...
- **Structural characterization:** RX, electron diffraction, ...

Keywords
Noise, Scanning probe microscopy, optical spectroscopy, transmission electron microscopy, scanning electron microscopy, electron diffraction, X-ray diffraction

Learning Prerequisites
**Recommended courses**
Basis courses in physics

**Important concepts to start the course**
fundamentals of optics, electromagnetics, atomic and solid-state physics

Learning Outcomes
By the end of the course, the student must be able to:
- Integrate the notions of critical reading of articles
- Assess / Evaluate scientific articles, their quality and defaults
- Interpret knowledge of several specific experimental methods

Transversal skills
• Communicate effectively, being understood, including across different languages and cultures.
• Give feedback (critique) in an appropriate fashion.
• Demonstrate the capacity for critical thinking
• Access and evaluate appropriate sources of information.
• Make an oral presentation.
• Summarize an article or a technical report.

Teaching methods
• Ex cathedra lectures on specific experimental techniques
• Students’ presentations of scientific articles

Expected student activities
Participation in class is encouraged.
Students are expected to give a short presentation of a scientific article.

Assessment methods
oral exam (100%)

Supervision
Others Moodle

Resources
Notes/Handbook
All is put on the Moodle site

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=15458