

MICRO-429

**Metrology practicals**

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Cursus	Sem.	Type
Microtechnics	MA2, MA4	Opt.
Minor in Imaging	E	Opt.
Quantum Science and Engineering	MA2, MA4	Opt.
Space technologies minor	E	Opt.

Language of teaching	English
Credits	3
Withdrawal Session	Unauthorized Summer
Semester Exam	Spring During the semester
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Practical work	3 weekly

**Number of positions**

**It is not allowed to withdraw from this subject after the registration deadline.**

**Remark**

Ces TP sont optionnels et ne peuvent être suivis qu'en parallèle du cours MICRO-428 Metrology

**Summary**

The student will get familiar with the techniques learnt in class (MICRO-428) and will put them to practice with experiments in the laboratory. There will be a practical training for each theme covered in class; the students will also learn good practices during measurements (lab notebook included).

**Content**

The topics covered by the course are summarized as follows:

- Introduction
- Dark count rate (DCR) and afterpulsing statistics in photon-counting device
- Sensitivity in photon-counting devices
- Timing jitter measurements in single-photon detectors
- Scanning electron microscopy
- Atomic force microscope

**Keywords**

SPAD, TCSPC, PDP, PDE, SPTR, CTR, DCR, AFM, SEM, optical microscopy

**Learning Prerequisites****Required courses**

MICRO-428 *Metrology*

**Recommended courses**

Design of Experiments

**Important concepts to start the course**

## Matlab for data read-out and processing

### Learning Outcomes

By the end of the course, the student must be able to:

- Choose an appropriate measurement methodology
- Develop the understanding of measurement tools and instruments
- Design a measurement experiment
- Interpret measurement results
- Investigate issues related to the accuracy and precision

### Transversal skills

- Demonstrate the capacity for critical thinking

### Teaching methods

One introductory lecture followed by lab practicals in the second half of the semester.

### Expected student activities

Mandatory advance preparation before each lab practical  
Experimentation and note taking/description (lab notebook)  
Interaction with the Lecturers and TAs

### Assessment methods

Continuous assessment for each lab practical

### Supervision

Office hours	Yes
Assistants	Yes

### Resources

#### Notes/Handbook

On Moodle: handouts of all practicals available after the Introductory lecture.

#### Moodle Link

- <https://go.epfl.ch/MICRO-429>