

MICRO-621

**MOOC: Micro and Nanofabrication (MEMS)**

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Cursus	Sem.	Type
Advanced Manufacturing		Opt.
Microsystems and Microelectronics		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Oral
Workload	30h
<b>Hours</b>	<b>28</b>
Lecture	14
Exercises	14
<b>Number of positions</b>	

**Remark**

September 18 to November 19, 2023 - Online course (self-paced)

**Summary**

Micro- and nanofabrication can be taught to students and professionals by textbooks and ex-cathedra lectures, but the real learning comes from seeing the manufacturing steps as they happen. This MOOC will not only explain the basics of microfabrication but also show the practice through videos.

**Content**

Microfabrication and nanofabrication are the basis of manufacturing for nearly all modern miniaturized systems that are ubiquitously used in our daily life. Examples include; computer chips and integrated sensors for monitoring our environment, cars, mobile phones, medical devices and more.

Micro- and nanofabrication can be taught to students and professionals by textbooks and ex-cathedra lectures, but the real learning comes from seeing the manufacturing steps as they happen.

In this engineering course, we will go a step beyond classroom teaching to not only explain the basics of each fabrication step but also show you how it's done through video sequences and zooming into the equipment.

**Course Syllabus**

Week 1: MEMS and cleanroom introduction

Week 2: Chemical vapour deposition (CVD)

Week 3: Physical vapour deposition (PVD)

Week 4: Lithography

Week 5: Dry etching

Week 6: Wet etching

Week 7: Metrology

**Keywords**

microfabrication, cleanroom techniques, theory and visual demonstration by video sequences, quizzes.

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

basics of physics and chemistry

**Recommended courses**

none

**Learning Outcomes**

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

- Select appropriately the correct fabrication process for a specific micro-device or microsystem
- Establish the workflow for the cleanroom processes
- Identify how physical and chemical phenomena govern miniaturized systems for various applications
- Manage resource planning for a given microsystem fabrication

### Assessment methods

#### Examination:

Individual oral examinations - slot of 15min  
held on November 23rd and 30th, 2023  
(15h to 17h)

### Resources

#### Bibliography

- "Fundamentals of Microfabrication and Nanotechnology, Volume II, Manufacturing Techniques for Microfabrication and Nanotechnology", Marc J. Madou, CRC Press
- "Introduction to Microfabrication, Second Edition", Sami Franssila, Wiley

### Ressources en bibliothèque

- [Fundamentals of microfabrication : the science of miniaturization / Madou](#)
- [Introduction to microfabrication / Franssila](#)

### Notes/Handbook

TA contact person:  
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### Moodle Link

- <https://go.epfl.ch/MICRO-621>