

MICRO-621

MOOC: Micro and Nanofabrication (MEMS)

Brugger Jürgen, Gijs Martinus

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

Language of teaching	English
Credits	1
Session	
Exam	Oral
Workload	30h
Hours	28
Courses	14
Exercises	14
Number of positions	

Remark

September 21 to November 22, 2020

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 examination

held on December 3rd and 10th, 2020

(15h to 18h)

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

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

Notes/Handbook

Contact person:

Claudio Gonnelli

claudio.gonnelli@epfl.ch