MICRO-605 **Optical MEMS and micro-optics**

Ataman Caglar

Cursus	Sem.	Type
Microsystems and Microelectronics		Opt.
Photonics		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Written
Workload	30h
Hours	**14**
Courses	14
Number of positions	**20**

Frequency

Every 2 years

Remark

November 10 to 13, 2026 in Lausanne from 13.00 to 16.30

Summary

Micro-optics and Optical MEMS let us shape light with unmatched precision and speed. From fiber networks to LIDAR, they drive innovation in compact systems. MICRO 605 takes you from core principles to breakthrough applications in this fast-evolving field.

Content

Micro-optics and Optical MEMS refer to a wide range of devices and methods that allow us to manipulate light at the wavelength scale with unprecedented precision and speed. Emerging from modern microsystems technology, they are at the heart of countless compact yet versatile optoelectronic systems such as fiber optic telecommunications networks, LIDAR, adaptive optics and endomicroscopy. MICRO605 is a comprehensive tour of the rich world of passive and active micro-optics, covering the subject from its fundamentals to its most exciting applications.

1. Optics at the micro-scale: An introduction (0.5 hours)
2. Fundamental optical concepts (2.5 hours)
2.1. Gaussian beam propagation
2.2. Scalar diffraction theory
2.3. Interference and interferograms
3. Micro-optics: Devices and applications (3 hours)
3.1. Refractive and diffractive microlenses
3.2. Diffraction gratings and diffractive-optical elements
3.3. Fabrication of micro-optics
4. Optical MEMS: Devices (3 hours)
4.1. From static to dynamic
4.2. Scanning and pointing micromirrors
4.3. Tunable diffraction gratings
4.4. Tunable micro-resonators
5. MOEMS Applications (3 hours)
5.1. Display and imaging systems
5.2. Optical communications
5.3. Scientific instrumentation
6. Emerging topics (0.5 hour)
EXAM:
Written report on a design study

Learning Prerequisites

Recommended courses

Basic knowledge of physics and mathematics
MICRO-621: Micro and Nanofabrication (MEMS)
MICRO-606: Scaling in MEMS

Resources

Bibliography

Micro-Optics: Elements, Systems and Applications, *edited by Hans Peter Herzig*
Fundamentals of Micro-Optics, *by Hans Zappe*
Optical MEMS, Nanophotonics, and Their Applications, *edited by Guangya Zhou & Chengkuo Lee*
MOEMS: Micro-Opto-Electro-Mechanical Systems, *by Manouchehr E. Motamedi*
Microsystem Design, *by Stephen Senturia*
Fundamentals of Microfabrication, *by Marc Madou*
Micro Electro Mechanical System Design, *by J. Allen*
Analysis and Design Principles of MEMS Devices, *by Minhang Bao*

Ressources en bibliothèque

- Find the references at the Library

Moodle Link

- https://go.epfl.ch/MICRO-605