

MICRO-520

**Laser microprocessing**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Mechanical engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.
Photonics minor	E	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Oral
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Courses	2 weekly
<b>Number of positions</b>	

**Summary**

The physical principles of laser light materials interactions are introduced with a large number of industrial application examples. Materials processing lasers are developing further and further, the lecture presents the physical limitations of the processes.

**Content**

## 1. Basics of laser processing

Lasers for machining, Optics - beam steering systems, beam quality; Optical properties of materials, Heat equation, Applications - and examples:

Laser induced chemical reactions at surfaces for marking applications,  
laser bending,  
hole drilling,  
laser cutting,  
laser induced ablation,  
generative processes

**Keywords**

laser, efficiency, beam quality, spot size, laser pulse duration, heat equation, losses, machining, marking, bending, drilling, cutting, ablation, generative processing, selective laser sintering, selective laser melting

**Learning Outcomes**

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

- Decide which laser to use for which task
- Interpret the result of a laser processed sample
- Optimize a virtual laser process

**Expected student activities**

participate actively in the lecture  
carry out exercises

**Assessment methods**

Oral examination

**Resources****Moodle Link**

- <https://go.epfl.ch/MICRO-520>