

MICRO-413

**Advanced additive manufacturing technologies**

Brugger Jürgen, Moser Christophe

Cursus	Sem.	Type
Mechanical engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
TP	1 weekly
<b>Number of positions</b>	<b>40</b>

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

**Summary**

Advanced 3D forming techniques for high throughput and high resolution (nanometric) for large scale production. Digital manufacturing of functional layers, microsystems and smart systems.

**Content**

High speed 3D printing with polymers (light based, single photon and two photon)

Fabrication methods for 3D nanometric resolution

Drop on demand digital printing

The TPs are linked to the theoretical material presented in the course.

The last part of the course, Industry speakers are invited to give lectures on selected topics of advanced additive manufacturing

**Keywords**

Micro-nano 3D manufacturing

Drop on demand printing

Ink formulation

High speed light management

Hybrid printing

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

- 40 students maximum (first come first serve if more than 40).
- required course: ME-413

**Learning Outcomes**

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

- Select appropriately advanced printing methods for a given printing requirement
- Realize 3D printing concepts and their limitations
- Match different printing methods to realize multi-functional 3D structures
- Manipulate advanced 3D printing equipment

### **Assessment methods**

Oral (count for 2/3 of the grade)

TP (count for 1/3 of the grade)

### **Resources**

#### **Notes/Handbook**

Selected sections (PDF format) in books:

Microdrop generator, Eric Lee, CRC press

Surface tension in microsystems, Springer

Additive Manufacturing Technologies, Ian Gibson, David Rosen, Brent Stucker, Springer

Selected papers and course slides.

#### **Moodle Link**

- <https://go.epfl.ch/MICRO-413>