MICRO-413

# Advanced additive manufacturing technologies

Brugger Jürgen, Moser Christophe

| Cursus | Sem. | Type |
|---|---|---|
| Materials Science and Engineering | MA2, MA4 | Opt. |
| Mechanical engineering | MA2, MA4 | Opt. |
| Microengineering minor | E | Opt. |
| Microtechnics | MA2, MA4 | Opt. |

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|---|---|
| Language of teaching | English |
| Credits | 4 |
| Withdrawal | Unauthorized |
| Session | Summer |
| Semester | Spring |
| Exam | Oral |
| Workload | 120h |
| Weeks | 14 |
| **Hours** | **4 weekly** |
| Courses | 2 weekly |
| TP | 2 weekly |
| **Number of positions** | **40** |

**Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.**

## 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

### Ressources en bibliothèque

- Find the references at the Library

### 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