

Module Description, available in: EN

Micromachining and Fabrication Processes in Microengineering

General Information**Number of ECTS Credits**

3

Module code

TSM_MicroFab

Valid for academic year

2021-22

Last modification

2021-02-11

Coordinator of the module

Florian Serex (HES-SO, florian.serex@he-arc.ch)

Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Lausanne			Lugano	Zurich		
Instruction	X E 100%						
Documentation	X E 100%						
Examination	X E 100%						

Module Category

TSM Technical scientific module

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences**Prerequisites, previous knowledge**

Physics, Materials, Mechanics : Basics for Engineers (bachelor level)

Brief course description of module objectives and content

The goal of the module is to give an overview on the existing micromachining and micromanufacturing processes commonly used in microengineering. The module covers the working principles and technical aspects of modern industrial micromachining equipment as well as photolithography-, engraving- and etching-based microfabrication techniques.

Aims, content, methods

Learning objectives and competencies to be acquired

After completion of the module participants will be able to

- explain the working principles of modern micromachining and micromanufacturing techniques and to discuss application examples from different industrial sectors;
- discuss the possibilities and limitations of different micromanufacturing techniques for various materials such as metals, ceramics, polymers, silicon;
- choose suitable micromachining and manufacturing techniques for given contexts of industrial need, taking into account parameters such as precision, speed and manufacturing costs from prototyping to small- and large-scale production.

Module content with weighting of different components

- Conventional machines for micro-engineering, such as milling, grinding, and five-axis machines (20%)
- Electrical Discharge Machining (EDM) (20%)
- Laser machining (20%)
- Measurement techniques for micromachining and microfabrication and in-line or in-process quality and precision control (20%)
- Further machining and fabrication techniques derived from the micro- and nanotechnology sector (20%)

Teaching and learning methods

Lectures, case studies, and exercises.

Literature

Assessment

Certification requirements

Module uses certification requirements

Certification requirements for final examinations (conditions for attestation)

Evaluation mode: Exercises and case study reports during the semester (33.3%), written final exam (66.7%).

Basic principle for exams

As a rule, all standard final exams are conducted in written form. For resit exams, lecturers will communicate the exam format (written/oral) together with the exam schedule.

Standard final exam for a module and written resit exam

Kind of exam

Written exam

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

- calculator (without telecommunication functionality)

Other permissible aids

- personal summary of two pages A4

Special case: Resit exam as oral exam

Kind of exam

Oral exam

Duration of exam

30 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

- calculator (without telecommunication functionality)

Other permissible aids

- personal summary of two pages A4