Courses in English
Course Description

Department	06 Applied Sciences and Mechatronics
Course title	**Micro- and Nanostructures**
Hours per week (SWS)	4
Number of ECTS credits	6
Course objective	After completing this module successfully students possess or have improved their competencies in the following fields: They know micro-and nanostructure fabrication processes and by discussing areas of application they can describe advantages and disadvantages; They have an improved understanding of semiconductor processes and tools and can draw them schematically; They know selected examples for micro-and nanostructures and -devices based on the mentioned processes, they can describe them physically and point out areas of application and the potential for further development; They have improved their physical understanding of solid state structures and devices with dimenions in the nanometer range; (They understand the interdisciplinary approach and comprehensive use of nanostructures and -devices. They can design a process flow for a given device, identify failures in thin film stacks, and develop improved processes. They have improved their technical English.
Prerequisites	Bachelor degree, Fundamentals in solid state physics
Recommended reading	Textbooks: S.M. Sze, Semiconductor Devices, Wiley,2002. R. Waser, Nanoelectronics and Information Technology: Materials, Processes, Devices, Wiley-VCH. Michael Köhler, Nanotechnologie, VCH Verlag, 2001. Moodle course with uptodate publications and video lectures.
Teaching methods	180 h, of which: 60 h seminaristic teaching 120 h individual work
Assessment methods	written exam, 90min
Language of instruction	English
Name of lecturer	Prof. Dr.-ing. Christina Schindler
Email	christina.schindler@hm.edu
Link	https://sci.hm.edu/kontakte_de/phonebook_detailseite_10761.de.html

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Course content

Semiconductor physics
Energy bands in semiconductors

Devices
MOS diodes
MOSFETs
New transistor concepts, e.g. cell-transistor coupling
Example of use: logic, scaling, integrated circuits

Semiconductor technology
Lithography
Etching technology (focus on KOH and dry etching)
Oxidation, diffusion, implantation
Thin film deposition (physical and chemical vapor deposition, self-assembling monolayers)
Printed electronics
Example of use: memory technology
Excercises to all discussed topics
Working on technical publications on the different topics and presentation in front of the class
short presentations of up-to-date topics in the field of "micro-and nanostructures"

The lecture is held in English.

Remarks