

Department	SciTec
Degree programme	SI
Module name	Microsystems Engineering
Module number	SciTec.2.198
Study and Examination Regulations	ER-version 38 (of 21.03.2018)
Compulsory/ compulsory optional/ optional module	compulsory optional module
Module coordinator	Prof. Dr. Michael Rüb
Module content	<p>Definition of <u>Microsystems Engineering</u>, latest state of the art and future developments.</p> <p>Process based presentation of the Microsystems Engineering topic:</p> <p><u>Materials of Microsystem Engineering:</u> Manufacturing and properties of silicon wafers, ideal and real materials, silicon compounds</p> <p><u>Thin Film Technology:</u> Thermal deposition, CVD, sputtering</p> <p><u>Basics of Lithography:</u> Process based generic presentation of important lithography techniques</p> <p><u>Surface Micromachining:</u> Sacrificial layer technology, silicon foundries, SOI technology</p> <p><u>Clean Rooms and Yield:</u> Properties of clean rooms, effect of defects on volume yield, root causes of defects, removal of defects</p> <p><u>Volume Micromachining:</u> 3-dim patterning by anisotropic wet chemical etching</p> <p><u>LIGA:</u> x-ray lithography, galvanic deposition, moulding, examples</p> <p><u>Assembly Technology:</u> Wafer sawing, mounting techniques, reliability, bonding techniques</p> <p><u>Examples of micromechanical devices:</u> DLP chip, Acceleration and rate sensors</p>
Learning objectives	The students learn to know the important components of microsystems and their manufacturing techniques.
Course type (lecture, seminar, exercises, practical course)	2 L – 0 S – 1 E – 0 P
Recommended literature	<ul style="list-style-type: none"> ▪ Büttgenbach; Mikromechanik; Teubner-Verlag 1991 ▪ Madou; Fundamentals of Microfabrication; CRC Press 1997 ▪ Menz, Mohr; Mikrosystemtechnik für Ingenieure; VCH-Verlag 1997 ▪ Völklein, Zetterer; Einführung in die Mikrosystemtechnik; Vieweg 2000
Learning materials	Lecture slides
Method(s) of instruction/ media being used	Lecture and seminar
Level/ category	Master (category: 2)
Which semester (winter/ summer term)	Winter term
Which semester during the programme	1
Requirements for attendance, necessary knowledge	Basic knowledge on physics, optics, vacuum and thin film technology
Assessment (written/ oral test, paper, etc.)	written examination (90 minutes)
ECTS credits	3
Work load in:	<p>90 h of total work load, therefrom</p> <ul style="list-style-type: none"> ▪ 45 h of presence at university ▪ 45 h of self-study
Usability of this module	Micro- and Nanotechnology
Frequency of offer	Every study year
Duration of module	1 semester
Place/ room	Ernst-Abbe-Hochschule Jena - University of Applied Sciences Jena
Time	According to schedule
Language(s)	English