



Msc. Microsystems Engineering - Introduction to the programme

- MSc. Program = 120 ECTS
- ~ 30 ECTS per semester
- 1 ECTS = 30 hours work load
- Mandatory courses are offered every other semester.
- Exams are offered every semester.
- The exam regulations stipulate *which* courses are to be completed to get the degree, but you can decide *when* you want to take which course and exam.
- It is allowed to study more than 4 semesters.



- All programs are organized in modules.
- A module consists of one or several courses and course work.

■ **Module Components**

- Lectures – German: Vorlesung (V)
- Exercises – German: Übung (Ü)
- Laboratories – German: Praktikum (Pr) oder Praktische Übung (PrÜ)
- Seminars – German: Seminar (S)



- **Non-graded course work (“Studienleistungen”, SL)**
 - Exercises, reports, mid-term exams...
 - Are not part of your final grade, but may be part of a module (for example weekly exercise sheets)
 - May be graded, or only “pass” or “fail”
 - Unlimited number of attempts

- **Graded course work (“Prüfungsleistungen”, PL)**
 - Written or oral exams, reports, presentations,...
 - Are always graded and count into your final grade
 - Limited number of attempts

Module	Type	Exam	ECTS	Sem
Microelectronics	Le+E	Written exam	5	1
Micro-mechanics	Le+E	Written exam	5	1
MST Design Lab I	La	?	3	1
Micro-optics	Le+E	Written exam	5	1
Sensors	Le+La	Written exam	5	1
MST Technologies and Processes	Le+E	Written exam	5	1
Probability and Statistics	Le+E	Written exam	5	1

Le = Lecture, E = Exercise, La = Lab course

Module	Type	Exam	ECTS	Sem
Signal Processing	Le+E	Written exam	5	2
Assembly and Packaging Tech.	Le+E	Written exam	5	2
Biomedical Microsystems	Le+E	Written exam	5	2
Micro-actuators	Le+E	Written exam	5	2
Micro-fluidics	Le+E	Written exam	5	2
Probability and Statistics	Le+E	Written exam	5	2
Master thesis		Thesis and pres.	30	4
Total Mandatory Modules			58	

Le = Lecture, E = Exercise, La = Lab course

Choose 2 areas, minimum 9 ECTS max. 23 ECTS in each of them.

Concentration areas	ECTS
Circuits and Systems	9-23
Design and Simulation	9-23
Life Sciences: Biomedical Engineering	9-23
Life Sciences: Lab-on-a-chip	9-23
Materials	9-23
MEMS Processing	9-23
Photonics	9-23
Sensors and Actuators	9-23
Personal Profile	9-23
Total Elective Modules	32

The following modules are only examples. The current offer can always be found in HisinOne.

Circuits and systems	Design and Simulation
Energy Storage and Conversion using Fuel Cells	Embedded Control Laboratory
Mixed Signal CMOS Circuit Design	Flight Control Laboratory
Advanced embedded Systems Laboratory	Modelling and System Identification
Advanced Laboratory in Microcontroller	Numerical Optimisation
Power Electronics: Devices and Concepts	Numerical Optimisation Software Project
Magnetic Microsystems	Numerical Optimal Control in Science and Engg.
Embedded Control Project	Optimal Control and Estimation
Microcontroller Techniques	Optimal and Model Predictive Control
Power Electronic Circuits and Devices	Race Car Control Lab
RF- and Microwave Devices and Circuits	VLSI System Design
RF- and Microwave Systems Design course	Wind Energy Systems
Systems Theory and automatic Control II	
Reliability Engineering	

Life Sciences: Biomedical Engg.	Life Sciences: Lab-on-a-chip
Analyse von Life Science Hochdurchsatzdaten mit Galaxy	Bioactive Polymer Surfaces
Selected Problems in Biosignal Processing	Biofuel Cells and Bioelectrochemical Systems
Biofunctional Materials - for medical microsystems and healthcare	BioMEMS
Biologie für Ingenieure	Biotechnology for Engineers I: Introduction, Molecular- and Microbiology
Bionic Sensors - Laboratory	Biotechnology for Engineers II
Biomedical Instrumentation I	Interfaces for Bioanalytical Systems
Biomedical Instrumentation II	Introduction to data driven life sciences
Biomedical Instrumentation - Laboratory	Basics in Molecular Biology for Bioanalytical Systems
Biophysics of the cell	Microfluidics II: Miniaturize, automate and parallelize biochemical analysis
Ethical Aspects of Neurotechnology	Surface Analysis
Fundamentals of electrical stimulation	
Introduction to physiological Control Systems	
Implant Manufacturing Technologies	
Signal processing and analysis in brain signals	
Microsystems technology in Medicine	
Nanobiotechnology	
Neurophysiology - Laboratory	
Neuroprosthetics	
Neuroscience for Engineers	

Materials	MEMS Processing
Bioactive Polymer Surfaces	Lithography
Bioactive Polymer Surfaces with seminar	Electrochemical production technologies
Bioinspired functional materials	CMOS-Integrated Microsystems
Computational physics: materials science	Advanced Assembly and Packaging Technology
Electrochemical Energy Applications: Batteries	Lithography
Semiconductor Technology and Devices	Advanced Silicon Technology
Ceramic Materials for microsystems	Micro-Acoustical Transducers
Ceramic technology in microsystems	Microstructured Polymer Components
Physics of Failure	Mold Flow Simulation for Replication Processes
Contact, Adhesion, Friction	Nanotechnology
Continuum Mechanics I with exercises	Advanced Engineering
Continuum Mechanics II with exercises	Surface Analysis Laboratory
Mechanical Properties and Degradation	Silicon-based Neural Technology
Mechanisms	Surface coating Techniques
Molecular Statics and Dynamics	
Nanomaterials	
Nano - Laboratory	
Particle Methods in Engineering	
Surface Analysis	
Polymer Chemistry for Engineers	
Polymers in Membrane Technology	
From Microsystems to the Nanoworld	
Dynamics of Materials	

Photonics	Sensors and Actuators
Advanced Topics in Micro-Optics	Thin Film Analyses and Nanoscale Measurement Technologies
Lasers	Bionic Sensors
Basic Optics Lab	Wireless Sensor Networks
Basic and Advanced Optics Lab	Wireless Sensor Systems
Optical Materials	Disposable sensors
Optical Properties of Micro and Nano Structures	Electrochemical energy applications: Li-ion batteries and fuel cells
Optical Trapping and Particle Tracking	Energy harvesting
Optical MEMS	Gas Sensors
Optical Measurement Techniques	Power Electronics for E-Mobility
Optical Micro-Sensors	Electrochemical Methods for Engineers
Optoelectronics	Mikroaktorik für Mikrosystemtechniker
Photonic Microscopy	Microacoustics
Photovoltaic Energy Conversion for engineers	Piezoelectric and dielectric transducers
Photovoltaic Energy Conversion for engineers II	Quantum mechanics for engineers
Spektroskopische Methoden	Electronics Signal Processing for Sensors and Actuators
Wave Optics	Thermoelektrik
	Compound semiconductor devices

MSE schedule, first semester

Mon	Tue	Wed	Thu	Fri
		8-10 Probability & Stat. Lecture 051-03-026	8-10 Micro-electronics Exercises 101 00 036	
10-12 Micromechanics Lecture online	10-12 Micro-optics Lecture 101 00 036	10-12 Micro-electronics Lecture 101 00 036	10-12 Probability & Stat. Exercises 051-03-026	10-12 Micromechanics Exercises 101 00 036
	13-14 MST Technologies & Processes Exercises		13-14 Sensors Lecture Online	12-14 MST Design Lab) Lab course 082 00 006
	14-16 Sensors Lecture Online		14-16 MST Technologies & Processes, lecture	14-16 Micro-optics Exercises
	16-18 MST Design Lab I Lecture 051 03 026		16-18 Sensors Lab 078 00 035	16-18 Sensors Lab 078 00 035
			18-20 Sensors Lab 078 00 035	