

General curriculum

Master program

Medical Systems Engineering



Explanation to the general curriculum:

S = semester hours (SWS)

A = Types of courses

V = Lecture

S = Seminar

Ü = Tutorial

K = Colloquium

LP = Lab Project

PRO = Research Project

E = Field trip

***** = Depends on the chosen modules or not applicable

CP = Credit Points



Legende zum Regelstudienplan:

S = Semesterwochenstunden (SWS)

A = Art der Lehrveranstaltung

V = Vorlesung

S = Seminar

Ü = Übung

K = Kolloquium

LP = Laborpraktikum

PRO = Wissenschaftliches Projekt

E = Exkursion

***** = Abhängig von der Modulwahl oder nicht zutreffend

CP = Credit Points = Leistungspunkte

General scheme

General scheme of the curriculum. The distribution of credit points within one depends on the chosen modules. The total workload is constant.

Regular curriculum	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Technical compulsory modules	31			14									45		
Methodical and social compulsory modules				5			5						10		
Elective modules - Deepening 1				5			10						15		
Elective modules - Deepening 2				5			10						15		
Elective modules from entire range							5						5		
Master Thesis										30			30		
	31 CP			29 CP			30 CP			30 CP			120 CP		

Research Track	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Technical compulsory modules	31			14									45		
Methodical and social compulsory modules				5			5						10		
Research Project				5			15						20		
Elective modules - Deepening 1				5			10						15		
Master Thesis										30			30		
	31 CP			29 CP			30 CP			30 CP			120 CP		

Detailed information about the modules can be found in the following charts.

Technical compulsory modules

Enrolment: All modules.

Regular curriculum and Research Track	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Anatomy for Engineering students	4	3	S										4	3	S
Biological Statistics	5	3	V/Ü										5	3	V/Ü
Medical Imaging and Diagnostics	5		V/Ü										5		V/Ü
<i>submodule: Introduction into Medical Imaging</i>		3	V/Ü											3	V/Ü
<i>submodule: Radiological Diagnostics</i>		1	V											1	V
Medical Measurement Technology	3		V	3		V							6		V
<i>submodule: Chemical and Biological Sensors</i>		2	V											2	V
<i>submodule: Ultrasonic Sensors for Imaging</i>				2		V								2	V
Medical Physics and Radiation Protection	5	3	V										5	3	V
Microsystems- and Nano-Technologies for Medical Solutions	5	3	V/Ü										5	3	V/Ü
Human-Computer Interfaces in Medicine	4	2	S										4	2	S
Mathematical foundations				6	4	V/Ü							6	4	V/Ü
Digital Information Processing				5	3	V/Ü							5	3	V/Ü
	31 CP			14 CP									45 CP		

Methodical and social compulsory modules

Enrolment: All modules.

Regular curriculum and Research Track	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Scientific working				5	4	S							5	4	S
MedTec Innovation Generation and Entrepreneurship							5	3	V/S				5	3	V/S
				5 CP			5 CP						10 CP		

Research Project within Research Track

Enrolment: All modules.

Research Track	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Research Project				5			15						20		
				5 CP			15 CP						20 CP		

Elective modules

Enrolment - regular curriculum: Choice of two deepening. Choice of modules with a total number of 15 CP per deepening. Choice of modules with a total number of 5 CP from the entire range in addition. Enrolment - Research Track: Choice of modules with a total number of 15 CP from one deepening.

Elective Modules - Deepening "Imaging"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Nuclear medicine							5	3	V/Ü				5	3	V/Ü
Methods of MRI				5	3	V/Ü							5	3	V/Ü
Computed Tomography				5		V/Ü	5		V/LP				10		V/Ü/LP
<i>submodule: Medical Imaging - Computed tomography</i>					3	V/Ü								3	V/Ü
<i>submodule: Computed Tomography in Material Science</i>							1		V					1	V
<i>submodule: Lab course CT</i>							2		LP					2	LP
				10 CP			10 CP						20 CP		

Elective Modules - Deepening "Intervention"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Instruments for IGP							5	3	V/S				5	3	V/S
Computer Assisted Surgery				5	3	S							5	3	S
Image Guided Procedures							5		S				5		S
<i>submodule: Medical Imaging in Interventional Endovascular Therapy</i>								1	S					1	S
<i>submodule: Seminar IGP</i>								2	S					2	S
				5 CP			10 CP						15 CP		

Elective Modules - Deepening "Biomedical Signals"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Digital Information Processing Lab							5	2	S				5	2	S
EMC of Medical Systems							5	3	V/Ü				5	3	V/Ü
Tomographic Imaging in Medicine				5	3	V/Ü							5	3	V/Ü
Functional Safety for Medical and Technical Systems				5	3	V/Ü							5	3	V/Ü
Lab course Electrophysiology							5	2	LP				5	2	LP
				10 CP			15 CP						25 CP		

Elective Modules - Deepening "Medical Microsystems"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Development of Bio-MEMS for Medical Engineering							10	6	V/Ü/LP				10	6	V/Ü/LP
MEMS-Packaging for Medical Solutions							5	3	V/Ü				5	3	V/Ü
							15 CP						15 CP		

Elective Modules - Deepening "Biomechanics and Haemodynamics"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Simulation and Numerical Methods in Biomechanics and Medical Engineering				8		V/Ü	2		S				10		V/S/Ü
<i>submodule: Computational Biomechanics</i>					4	V/Ü								4	V/Ü
<i>submodule: Simulation in Medicine and Medical Engineering</i>								1	S					1	S
Rheology and Rheometry							5	3	V/PRO				5	3	V/PRO
Computational Fluid Dynamics							5	3	V/PRO				5	3	V/PRO
				8 CP			12 CP						20 CP		

Elective Modules - Deepening "Medical Computer Science"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Bayesian network				5	4	V/Ü							5	4	V/Ü
Machine Learning for Medical Systems				5	4	V/S							5	4	V/S
Image Coding				5	3	V/Ü							5	3	V/Ü
Advanced Security Issues in Medical Systems							5	3	S				5	3	S
Medical Visualization							5	4	V/Ü				5	4	V/Ü
Selected Topics in Image Understanding							5	3	V/Ü				5	3	V/Ü
				15 CP			15 CP						30 CP		

Elective Modules - Deepening "Neuro-Biology"	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Theoretical Neuroscience I				5	3	V							5	3	V
Theoretical Neuroscience II							5	3	V				5	3	V
Analysis and modeling of Physiological Systems submodule: Mathematical Modeling of physiological Systems submodule: Brain Computer Interfaces				4	2	V V	1		LP LP				5	2 1	V/LP V LP
				9 CP			6 CP						15 CP		

Master Thesis

	1. Semester			2. Semester			3. Semester			4. Semester			Summe		
	CP	S	A	CP	S	A	CP	S	A	CP	S	A	CP	S	A
Master Thesis										30			30		
										30 CP			30 CP		