

Masterstudiengang Biomedical Engineering

Master's Program Biomedical Engineering

- Zugangs- und Auswahlverfahren / Admission and Selection**
- Studienplan und Fokusfelder / Study Plan and Focus Fields**

Profile of the study programs: **Informationalization and Digitalization in Medical Technology**
Hosting faculty: **KIT-Fakultät für Elektrotechnik und Informationstechnik (ETIT)**

Medizintechnik BSc

German program
6 semester (180 ECTS)
Start WS 22/23
Admission restricted: 50/Year

Biomedical Engineering MSc

English program
4 semester (120 ECTS)
Start WS 25/26
Admission restricted: 75/Year

Completion Competencies

- Engineering expertise
- Medical application expertise
- Methodological expertise for the development, production and approval of medical devices

Other Bachelor's degrees from:

Engineering sciences
Natural sciences
Computer sciences
Mathematics

Intended Professional Fields

- R&D Engineer,
- Application specialist, Project manager
- Regulatory-, Clinical-, Quality specialist
- Scientific career

Der Studiengang ist zulassungsbeschränkt / The admission is restricted.

Die nominale Kapazität beträgt 75 Studierende pro Jahrgang / The nominal capacity is 75 students per year

Die Studienplätze werden nach einem 2-stufigen Verfahren vergeben / The study places are allocated according to a 2-stage procedure:

1. Zugangsvoraussetzungen – Admission Requirements

- Sprachkenntnisse Englisch – English Language Skills
- Bachelor-Abschlüsse – Bachelor's Degrees
- Mindestleistungen – Minimum Achievements

2. Auswahlverfahren – Selection Process

- Es wird eine Rangliste nach Punkten gebildet – Forming a Ranking List
- Punkte für die Abschlussnote – Point Awards for the Final Grade
- Punkte für Studien- und Prüfungsleistungen – Point Awards for Study Achievements

Sprachkenntnisse Englisch – English Language Skills

Quelle: *Zulassungs- und Immatrikulationsordnung des KIT (2021) §5(4), verkürzte Formulierung:*

- Nachweis ausreichender Kenntnisse mindestens auf dem Level B2 (Zertifikat)
- alternativ:
 - Schulabschluss mit Englisch als einzige Unterrichtssprache
 - Abitur mit mindestens 5 Jahren Englisch

Quelle: *Satzung für das hochschuleigene Zugangs- und Auswahlverfahren im Masterstudiengang Biomedical Engineering:*

- alternativ:
 - Abschlusszeugnis eines englischsprachigen Bachelorstudiengangs
 - Englischsprachige Bachelorarbeit

Zugangsvoraussetzungen – Admission Requirements

Bachelor-Abschlüsse – Bachelor's Degrees

Quelle: *Satzung für das hochschuleigene Zugangs- und Auswahlverfahren im Masterstudiengang Biomedical Engineering*

- ein bestandener Bachelorabschluss in / successfully completed bachelor's degree program in:
 - Medizinische oder Biomedizinische Technik / Biomedical Engineering
 - Elektrotechnik- und Informationstechnik / Electrical Engineering and Information Technology
 - Mechatronik / Mechatronics Engineering
 - Maschinenbau / Mechanical Engineering
 - Informatik / Computer Science
 - Physik, Chemie, Biologie / Natural Sciences
 - Mathematik / Mathematics

- mindestens dreijährigen Regelstudienzeit / at least three years of standard study period
- mindestens / minimum 180 ECTS

Zugangsvoraussetzungen – Admission Requirements

Mindestleistungen – Minimum Achievements

Quelle: *Satzung für das hochschuleigene Zugangs- und Auswahlverfahren im Masterstudiengang Biomedical Engineering*

- a) Höhere Mathematik / higher mathematics: 12 LP / ECTS
- b) Informationstechnik / information technology: 12 LP / ECTS

Bewertung der Bachelor-Abschlussnote – Point Awards for the Final Bachelor's Grade

Quelle: *Satzung für das hochschuleigene Zugangs- und Auswahlverfahren im Masterstudiengang Biomedical Engineering*

Note	Punktzahl
1,0	50
1,1	47
1,2	44
1,3	41
1,4	38
1,5	35
1,6	32
1,7	29
1,8	26
1,9	23
2,1	20
2,0	17
2,2	14
2,3	11
2,4	8
2,5	5
2,6	2
2,7	0

Im qualifizierenden Studiengang erbrachte Leistungen – Achievements in the Qualifying Degree Program

Quelle: *Satzung für das hochschuleigene Zugangs- und Auswahlverfahren im Masterstudiengang Biomedical Engineering*

- Es können maximal 107 Punkte erreicht werden / total maximum number of 107 points (1 Punkt = 1 LP/ECTS)
 - (Bio-)Medizintechnik / biomedical engineering modules: max. 24 points
 - Mathematik / mathematics modules: max. 28 points
 - Informationstechnik / information technology modules: max. 33 points
 - Elektrotechnik / electrical engineering modules: max. 22 points

Bachelorstudiengang Medizintechnik

Leistungspunkte	1. Semester	2. Semester	3. Semester	4. Semester	5. Semester	6. Semester
10 LP	Höhere Mathematik I (11 LP, 6+2 SWS)	Höhere Mathematik II (8 LP, 4+2 SWS)	Wahrscheinlichkeitstheorie (5 LP, 2+1 SWS)	Medical Imaging Technology (6 LP, 4 SWS)	Medizinisch-technischer Profilierungsbereich (Wahlpflichtbereich) (30 LP)	Industrie-, Forschungs- oder Klinikpraktikum (15 LP)
		Höhere Mathematik III (4 LP, 2+1 SWS)	Elektromagnetische Felder und Wellen (7 LP, 3+2 SWS)	Angewandte Medizintechnik (Exkursion und Praktikum) (4 LP, 3 SWS)		
20 LP	Lineare Elektrische Netze* inkl. Workshop (8 LP, 3+1+2 SWS)	Elektronische Schaltungen inkl. Workshop (7 LP, 3+1+1 SWS)	Biomedizinische Messtechnik (6 LP, 4 SWS)	Mess- und Regelungstechnik (6 LP, 2+2 SWS)		Bachelorarbeit inkl. Vortrag (15 LP)
			Journal Club (2 LP, 2 SWS)	SuS Workshop (1 LP, 1 SWS)		
30 LP	Physiologie und Anatomie für die Medizintechnik* (3 LP, 2 SWS)	Physiologie und Anatomie für die Medizintechnik* (3 LP, 2 SWS)	Signale und Systeme (SuS) (7 LP, 3+2 SWS)	Grundlagen der Datenübertragung (6 LP, 2+2 SWS)		
	Grundlagen der Digitaltechnik und Systemmodellierung (6 LP, 3+1 SWS)	Informations- und Automatisierungstechnik inkl. Praktikum (7 LP, 3+1+1 SWS)	Medizinisch-technischer Profilierungsbereich (Wahlpflichtbereich) (3 LP)	Medizinisch-technischer Profilierungsbereich (Wahlpflichtbereich) (7 LP)		
	Überfachl. Qualifikationen (2 LP)	Überfachl. Qual. (1 LP)				

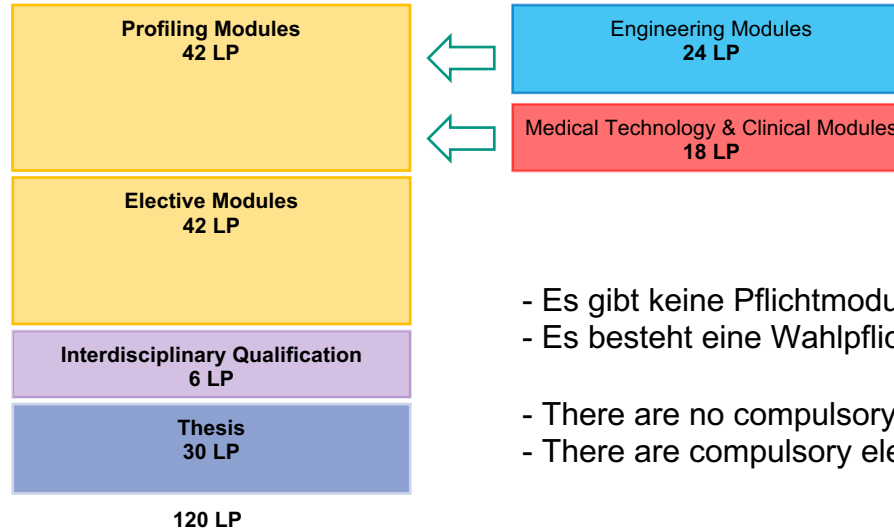
Fachgebiete

Mathematisch-physikalische Grundlagen	28 LP
Elektrotechnik	22 LP
Informationstechnik	33 LP
Medizinisch-technische Grundlagen	24 LP
Medizinisch-technischer Profilierungsbereich	40 LP
Überfachliche Qualifikationen	3 LP
Berufspraktikum	15 LP
Bachelorarbeit	15 LP

Informationen zum Studiengang – Information on the Study Program

- Aufbau des Studiengangs – Design of the Study Program
- Generischer Studienplan – Generic Study Plan
- Fokusfelder – Focus Fields
- Empfohlene Modulwahl – Recommended Selection of Courses

Master Course Biomedical Engineering – Fächer / Subjects



- Es gibt keine Pflichtmodule
- Es besteht eine Wahlpflicht innerhalb der Fächer
- There are no compulsory modules
- There are compulsory electives within the subjects

Master Course Biomedical Engineering – Studienplan / Study Plan

Semester 1:	Semester 2	Semester 3 (Mobility Window)	Semester 4
Engineering Modules 12 LP	Engineering Modules 12 LP	Elective Modules 30 LP Mobility Window.	Thesis 30 LP
Medical Technology & Clinical Modules 12 LP	Medical Technology & Clinical Modules 6 LP		
Elective Modules 6 LP	Elective Modules 6 LP		
	Interdisciplinary Qualification 6 LP		

Master Course Biomedical Engineering – Focus Fields

Focus Field 1 Biomedical Imaging and Signal Processing	Focus Field 2 Biomedical Robotics	Focus Field 3 Bioelectronics - Materials and Interfaces	Focus Field 4: Medical Product Development	Focus Field 5: Modelling & Simulation for Medicine
Engineering Modules 24 LP				
Medical Technology & Clinical Modules 18 LP				

The **purpose of focus fields** is:

- to provide the students with orientation and recommendation for individual study plans
- to assign shared ownership and responsibility for the design and the maintenance for the study program
- to communicate the flagship focus fields in the study program advertising

The **content of subjects** is:

- **Engineering Modules:** Courses that serve to deepen engineering science and provide the technical and scientific basis for the focus fields.
- **Medical Modules:** Courses that teach the biomedical-technical content for the focus fields.
- **Clinical Modules:** Courses that teach the medical background and application for the focus fields.

- There is no obligation to choose a focus field!
- There is free choice of an individual study program within the scope of the elective offers!

Focus Field 1: Biomedical Imaging and Signal Processing

Recommended modules:

Engineering Modules (EM, min. 18 CR)		WS		SS	
		SWS	LP	SWS	LP
in English					
Advanced Artificial Intelligence	<i>M-INFO-106299</i>			4	<u>6</u>
Explainable Artificial Intelligence	<i>M-INFO-106302</i>			2	<u>3</u>
Laser Physics	<i>M-ETIT-100435</i>	2+1	<u>4</u>		
Machine Learning - Foundations and Algorithms	<i>M-INFO-105778</i>			3	<u>6</u>
Optical Engineering	<i>M-ETIT-100456</i>	2	3		
Optoelectronic Components	<i>M-ETIT-100509</i>			2+1	4
in German					
Bildverarbeitung	<i>M-ETIT-102651</i>			2	3
Deep Learning für Computer Vision I: Grundlagen	<i>M-INFO-105753</i>			2	3
Deep Learning für Computer Vision II: Fortgeschrittene Themen	<i>M-INFO-105755</i>	2	3		
Integrierte Intelligente Sensoren	<i>M-ETIT-100457</i>			2	3
Mikrosystemtechnik	<i>M-ETIT-100454</i>	2	3		

General notes:

Gray backgrounds indicate modules/courses given in English. German titles indicate modules/courses given only in German.

Bold and underlined credits are used to illustrate an exemplary curriculum.

1 will be offered in English with starting the MSc BME program

2 will be offered with starting the MSc BME program

* can be chosen either in winter term or in summer term.

The module selection refers to the status of the module handbook as of 02/08/2024.

Changes and extensions are to be expected before the start of the study program.

Medical Technology and Clinical Modules (MTCM, min. 14 CR)					
in English					
Advanced Molecular Cell Biology	<i>M-CHEMBIO-101904</i>	3	<u>5</u>		
Basic Molecular Cell Biology	<i>M-CHEMBIO-101903</i>			2	3
Computational Imaging	<i>M-INFO-106190</i>	3	5		
Imaging Techniques in Light Microscopy	<i>M-CHEMBIO-101905</i>	2	3		
Medical Image Processing for Guidance and Navigation	<i>M-ETIT-106672</i>	6	<u>9</u>		
Optical Systems in Medicine and Life Science	<i>M-ETIT-103252</i>	2	3		
Optics and Vision in Biology	<i>M-CHEMBIO-101906</i>	3	4		
Scientific Group Project in Medical Ultrasound Imaging	<i>M-ETIT-106775</i>	2	3		
AI for Medical Technology ²	-	4	6		
Modules provided by Städtisches Klinikum Karlsruhe	-	tbd	tbd	tbd	tbd
in German					
Gehirn und Zentrales Nervensystem	<i>M-INFO-100725</i>	2	3	or 2	3
Laboratory/Practical Courses (one to be chosen)					
Medical Measurement Technology Lab ¹	<i>M-ETIT-106779</i>	2	<u>3</u>	4	<u>6</u>
Signal Processing Lab	<i>M-ETIT-106633</i>			4	6
Sum (EM+MTCM+Lab)			21		21

Summary	LP
Engineering Modules	19
Medical Technology and Clinical Modules	14
Laboratory/Practical Courses	9
Elective Modules (<i>see last page of chapter</i>)	42
Interdisciplinary Qualifications	6
Master's Thesis	30
Sum	120

Focus Field 2: Biomedical Robotics



Recommended modules:

		WS		SS	
		SWS	LP	SWS	LP
Engineering Modules (EM, min. 18 CR)					
in English					
Advanced Artificial Intelligence	<i>M-INFO-106299</i>			4	<u>6</u>
Computational Imaging	<i>M-INFO-106190</i>	3	5		
Explainable Artificial Intelligence	<i>M-INFO-106302</i>			2	3
Humanoid Robots – Locomotion and Whole-Body Control	<i>M-INFO-106649</i>			4	6
Machine Learning - Foundations and Algorithms	<i>M-INFO-105778</i>			3	6
Measurement Technology (<i>last time WS 25/26</i>)	<i>M-ETIT-105982</i>	2+1	<u>5</u>		
Methods of Signal Processing ¹	<i>M-ETIT-100540</i>	2+2	6		
Numerical Methods	<i>M-MATH-105831</i>			2+1	6
Optimization of Dynamic Systems	<i>M-ETIT-100531</i>	3	6		
Reinforcement Learning	<i>M-INFO-105623</i>	4	6		
Robotics II - Humanoid Robotics	<i>M-INFO-102756</i>			2	4
Seminar: Exploring Robotics - Insights from Science Fiction, Research and Society	<i>M-INFO-106651</i>			2	3
Simulation and Optimization in Robotics and Biomechanics	<i>M-INFO-106504</i>	4	6		
Systems and Software Engineering	<i>M-ETIT-100537</i>	2+1	<u>6</u>		
Wearable Robotic Technologies	<i>M-INFO-103294</i>			2	<u>4</u>
Advanced Control Systems 1 ²	-		6	or	6
Advanced Control Systems 2 ²	-		6	or	6
Automation Control and Robotics ²	-		6	or	6
Modeling and Digital Twin Engineering ²	-		6	or	6
Multivariable Control ²	-		6	or	6
in German					
Bildverarbeitung	<i>M-ETIT-102651</i>			2	3
Deep Learning for Computer Vision I: Grundlagen	<i>M-INFO-105753</i>			2	3
Deep Learning for Computer Vision II: Fortgeschrittene Themen	<i>M-INFO-105755</i>	2	3		
Informationsfusion	<i>M-ETIT-103264</i>	2+1	4		
Software Engineering	<i>M-ETIT-100450</i>	2	3		

		WS		SS	
		SWS	LP	SWS	LP
Medical Technology and Clinical Modules (MTCM, min. 14 CR)					
in English					
Medical Image Processing for Guidance and Navigation	<i>M-ETIT-106672</i>	6	<u>9</u>		
Optical Systems in Medicine and Life Science	<i>M-ETIT-103252</i>			4	<u>6</u>
Seminar: Assistive robotics and exoskeletons in medical applications	<i>M-INFO-106400</i>	2	3		
AI for Medical Technology ²	-	4	6		
Cyberphysical Human Machine Systems ²	-		6	or	6
Digital Twins for Human-Centred Robotics ²	-	4	6	or 4	6
Joint seminar with clinical partners ²	-	2	3	or 2	3
Modules provided by Städtisches Klinikum Karlsruhe	-	tbd	tbd	tbd	tbd
in German					
Gehirn und Zentrales Nervensystem:	<i>M-INFO-100725</i>	2	3	or 2	3
Ultraschall-Bildgebung	<i>M-ETIT-100560</i>			2	3
Laboratory/Practical Courses (one to be chosen)					
Medical Measurement Technology Lab ¹	<i>M-ETIT-106779</i>	2	3	4	6
Practical Course: Human-Centred Robotics	<i>M-INFO-106646</i>			4	<u>6</u>
Practical Course: Movement and Technology	<i>M-INFO-106648</i>			4	6
Practical Machine Learning ¹	<i>M-ETIT-106673</i>			2+1	5
Signal Processing Lab	<i>M-ETIT-106633</i>			4	6
in German					
Praktikum Software Engineering	<i>M-ETIT-100460</i>			4	6
Sum (EM+MTCM+Lab)			20		22
Summary				LP	
Engineering Modules				21	
Medical Technology and Clinical Modules				15	
Laboratory/Practical Courses				6	
Elective Modules (<i>see last page of chapter</i>)				42	
Interdisciplinary Qualifications				6	
Master's Thesis				30	
Sum				120	

Focus Field 3: Bioelectronics - Materials and Interfaces

Recommended modules:

Engineering Modules (EM, min. 18 CR)		WS		SS	
		SWS	LP	SWS	LP
in English					
Basics of Nanotechnology I	<i>M-PHYS-102097</i>	2	4		
Basics of Nanotechnology II	<i>M-PHYS-102100</i>			2	4
Materials Characterization	<i>M-MACH-103714</i>	4+2	6		
Measurement and Control Systems	<i>M-MACH-101921</i>	3+1	6		
Micro Magnetic Resonance	<i>T-MACH-105782</i>	2	4		
Microscale Fluid Mechanics	<i>M-MACH-106539</i>	2	4		
Modern VLSI Technologies ¹	<i>M-ETIT-105892</i>			2+1	6
Nano- and Quantum Electronics	<i>M-ETIT-105604</i>			3+1	6
Properties (Microstructure-Property-Relationships)	<i>M-MACH-103713</i>	4+2	6		
Surface Science	<i>M-PHYS-106483</i>			4	8
in German					
Rheologie von Polymeren	<i>M-CIWWT-104329</i>			2	4
Sol-Gel-Prozesse	<i>M-CIWWT-104489</i>	2	4		

Medical Technology and Clinical Modules (MTCM, min. 14 CR)						
in English						
Medical Image Processing for Guidance and Navigation	<i>M-ETIT-106672</i>	6	9			
Modeling Physiological Systems	<i>M-ETIT-106782</i>			4	6	
Optical Systems in Medicine and Life Science	<i>M-ETIT-103252</i>	2	3			
Scanning Probe Lithography for Biomedical Applications ²	-	2	3			
Modules provided by Städtisches Klinikum Karlsruhe	-	tbd	tbd	tbd	tbd	
in German						
BioMEMS - Mikrosystemtechnik für Life-Sciences und Medizin I	<i>M-MACH-100489</i>	2	4			
BioMEMS - Mikrosystemtechnik für Life-Sciences und Medizin II	<i>M-MACH-100490</i>			2	4	
BioMEMS - Mikrosystemtechnik für Life-Sciences und Medizin III	<i>M-MACH-100491</i>			2	4	
BioMEMS - Mikrosystemtechnik für Life-Sciences und Medizin IV	<i>M-MACH-105483</i>	2	4			
BioMEMS - Mikrofluidische Chipsysteme V	<i>M-MACH-105484</i>	2	4			
Ubiquitäre Informationstechnologien	<i>M-INFO-100789</i>	2+1	5			
Laboratory/Practical Courses (one to be chosen)						
Lab Course on Nanoelectronics	<i>M-ETIT-100468</i>	4*	6*	4*	6*	
Laboratory Nanotechnology	<i>M-ETIT-100478</i>	4*	6*	4*	6*	
Medical Measurement Technology Lab ¹	<i>M-ETIT-106779</i>	2	3	4	6	
Sum (EM+MTCM+Lab)			26		16	

Summary		LP
Engineering Modules		18
Medical Technology and Clinical Modules		18
Laboratory/Practical Courses		6
Elective Modules (<i>see last page of chapter</i>)		42
Interdisciplinary Qualifications	<i>M-ETIT-105803</i>	6
Master's Thesis		30
Sum		120

Focus Field 4: Medical Product Development

Recommended modules:

Engineering Modules (EM, min. 18 CR)		WS		SS	
		SWS	LP	SWS	LP
in English					
Digital Twin Engineering	M-ETIT-106040	2	4		
Drive Systems Engineering - B ²	Draft without code	2	4		
HRI and Social Robotics	M-INFO-106650			4	6
Humanoid Robots – Locomotion and Whole-Body Control	M-INFO-106649			4	6
Measurement and Control Systems	M-MACH-101921	3+1	6		
Measurement Technology (last time WS 25/26)	M-ETIT-105982	2+1	5		
Robotics II - Humanoid Robotics	M-INFO-102756			2	4
Seminar: Assistive robotics and exoskeletons in medical applications	M-INFO-106400	2	3		
Seminar: Exploring Robotics - Insights from Science Fiction, Research and Society	M-INFO-106651			2	3
Seminar: Human-Robot Interaction	M-INFO-106498	2	3		
Wearable Robotic Technologies	M-INFO-103294			2	4
Advanced Systems Engineering ²	-			2	5
Automation Control and Robotics ²	-		6	or	6
Cyberphysical Human Machine Systems ²	-		6	or	6
Digital Twins for Human-Centred Robotics ²	-	4	6	or	6
Methods and Processes of Sustainable Engineering	-	3	5		
Modeling and Digital Twin Engineering ²	-		6	or	6
in German					
Gerätekonstruktion	M-MACH-102705			3+1	8
Software Engineering	M-ETIT-100450	2	3		

Recommended modules:

Medical Technology and Clinical Modules (MTCM, min. 14 CR)		WS		SS	
		SWS	LP	SWS	LP
in English					
Emergency Medicine and Pathophysiology ²	Draft without code	2	4		
Human Factors Engineering I ¹	Draft without code	2	4		
Modeling Physiological Systems	M-ETIT-106782			4	6
Organ Support Systems ¹	M-MACH-102702			2	4
Principles of Medicine for Engineers ¹	M-MACH-102720	2	4		
Medical Product Development ²	-	3	5		
Medical Systems Engineering ²	-	tbd	tbd	tbd	tbd
Requirements for Medical Devices ²	-	2	3	or 2	3
Modules provided by Städtisches Klinikum Karlsruhe	-	tbd	tbd	tbd	tbd
Laboratory/Practical Courses (one to be chosen)					
Practical Course: Human-Centred Robotics	M-INFO-106646			4	6
Practical Course: Movement and Technology	M-INFO-106648			4	6
Reliability and Test Engineering ¹	M-MACH-106050	2+2	6		
in German					
CAE-Workshop	M-MACH-102684	3*	4*	3*	4*
Praktikum Software Engineering	M-ETIT-100460			4	6
Sum (EM+MTCM+Lab)			23		19
Summary				LP	
Engineering Modules				22	
Medical Technology and Clinical Modules				14	
Laboratory/Practical Courses				6	
Elective Modules (see last page of chapter)				42	
Interdisciplinary Qualifications		M-ETIT-105803		6	
Master's Thesis				30	
Sum				120	

Focus Field 5: Modelling and Simulation for Medicine

Recommended modules:

		WS		SS	
Engineering Modules (EM, min. 18 CR)		SWS	LP	SWS	LP
in English					
Measurement Technology (<i>last time WS 25/26</i>)	<i>M-ETIT-105982</i>	2+1	5		
Methods of Signal Processing ¹	<i>M-ETIT-100540</i>	2+2	6		
Numerical Methods	<i>M-MATH-105831</i>			2+1	6
Operations Research in Health Care Management	<i>M-WIWI-106853</i>	2+1	5	2+1	5
Optimization of Dynamic Systems	<i>M-ETIT-100531</i>	3	6		
Cyber-Physical Modeling	<i>M-ETIT-105468</i>			3+1	6
Systems and Software Engineering	<i>M-ETIT-100537</i>	2+1	6		
in German					
Grundlagen Finite Elemente	<i>M-BGU-100134</i>	2+2	6		
Numerische Methoden für partielle Differentialgleichungen	<i>M-ETIT-102311</i>			2+1	4
Medical Technology and Clinical Modules (MTCM, min. 14 CR)					
in English					
Medical Image Processing for Guidance and Navigation	<i>M-ETIT-106672</i>	6	9		
Modeling Physiological Systems	<i>M-ETIT-106782</i>			4	6
AI for Medical Technology ²	-	4	6		
Modules provided by Städtisches Klinikum Karlsruhe	-	tbd	tbd	tbd	tbd
in German					
Gehirn und Zentrales Nervensystem	<i>M-INFO-100725</i>	2	3	or 2	3
Ubiquitäre Informationstechnologien	<i>M-INFO-100789</i>	2+1	5		
Laboratory/Practical Courses (one to be chosen)					
Medical Measurement Technology Lab ¹	<i>M-ETIT-106779</i>	2	3	4	6
Practical Machine Learning ¹	<i>M-ETIT-106673</i>			2+1	5
Sum (EM+MTCM+Lab)			19		23

Summary		LP
Engineering Modules		22
Medical Technology and Clinical Modules		15
Laboratory/Practical Courses		5
Elective Modules (<i>see last page of chapter</i>)		42
Interdisciplinary Qualifications	<i>M-ETIT-105803</i>	6
Master's Thesis		30
Sum		120

Elective Modules

Possible modules:

		WS		SS	
Electives (min. 27 CR)		SWS	LP	SWS	LP
in English					
all modules mentioned in the Focus Fields					
Deep Learning und Neuronale Netze	<i>M-INFO-104460</i>			4	6
in German					
all modules mentioned in the Focus Fields					
Kontextsensitive Systeme	<i>M-INFO-100728</i>			2+1	5
Praxis-Seminar: Health Care Management (mit Fallstudien)	<i>M-WIWI-106852</i>	3	5	3	5
Regelung linearer Mehrgrößensysteme	<i>M-ETIT-100374</i>	3+1	6		
Laboratory/Practical Courses (0 or 1)					
in English					
CAE-Workshop ¹	<i>M-MACH-102684</i>	3*	4*	3*	4*
Lab Course on Nanoelectronics	<i>M-ETIT-100468</i>	4*	6*	4*	6*
Laboratory Nanotechnology	<i>M-ETIT-100478</i>	4*	6*	4*	6*
Medical Measurement Technology Lab ¹	<i>M-ETIT-106779</i>			4	6
Practical Course: Human-Centred Robotics	<i>M-INFO-106646</i>			4	6
Practical Course: Movement and Technology	<i>M-INFO-106648</i>			4	6
Practical Machine Learning ¹	<i>M-ETIT-106673</i>			2+1	5
Signal Processing Lab	<i>M-ETIT-106633</i>			4	6
Student Innovation Lab (2-term module)	<i>M-ETIT-105073</i>	2-4	3	2+2	9+3
in German					
Praktikum Software Engineering	<i>M-ETIT-100460</i>			4	6
Praktikum Neuronale Netze - Praktische Übungen	<i>M-INFO-103143</i>	2	3		
ProVIL – Produktentwicklung im virtuellen Ideenlabor	<i>M-MACH-105418</i>			4	4

Additional elective modules will be added, especially from the elective area of the MSc program “Electrical Engineering and Information” as well as from other KIT-Departments