

# Module Catalog Master Programme Medical Engineering - Valid from FPO version 2022 & 2023

## Branch of Study "Medical Robotics"

Please note the Module Descriptions in Campo!

Module Group	Module Number	Modules		SWS L+E+S+P	Total Sum ECTS	1st Year		2nd Year		Language	Course Achievement Modalities	Department	Responsible Chair(s)	WS/SS
		Module Name (Name of Lecture)	Abbr.			WS	SS	WS	SS					
						ECTS	ECTS	ECTS	ECTS					

M 1 Medical Specialisation				L+E+S+P	10	5	5	0	0					
M 1.1	Fundamentals in Anatomy and Physiology for Engineers	OMED/FAP	4+0+0+0	5	5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Anatomie II (Prof. Dr. Paulsen)	SS
M 1.2	Applications of nanotechnology in cardiovascular diseases	HNO 18	0+0+2+0	2,5	2,5	0	0	0	0	EN	gCA	MED	Professur für Nanomedizin (Stiftungsprofessur der Else Kröner-Fresenius-Stiftung)	WS/SS
M 1.3	Medizinische Biotechnologie / Medical Biotechnology	MBT	3+1+0+0	5	5	0	0	0	0	EN	gCA	CBI	Lehrstuhl für Medizinische Biotechnologie (MBT)	SS
M 1.4	Introduction to medical physics in radiation therapy	MEDPHYS-I	2+0+0+0	2,5	2,5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Strahlentherapie	WS
M 1.5	Lab class on medical physics in radiation therapy	MEDPHYS-III	0+0+0+2	5	5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Strahlentherapie	SS
M 1.6	Special topics of medical physics in radiation therapy	MEDPHYS-II	2+0+0+0	2,5	2,5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Strahlentherapie	SS
M 1.7	Medical Physics in Nuclear Medicine	MPNM	2+0+0+0	2,5	2,5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Klinische Nuklearmedizin	WS
M 1.8	Jüngste Entwicklungen der medizinischen Systembiologie / Advances in Medical Systems Biology	AdvMedSys	0+0+3+0	2,5	2,5	0	0	0	0	EN	PfE	MED	Lehrstuhl für Haut- und Geschlechtskrankheiten	SS
M 1.9	Introduction to simulation, network and data analysis in Medical Systems Biology	IntSysMed_f_Eng	2+0+0+0	5	5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Haut- und Geschlechtskrankheiten	WS
M 1.10	Systems Oncology: bioinformatics and computer modelling in cancer	OncoSys_f_Eng	2+0+0+0	2,5	2,5	0	0	0	0	EN	gCA	MED	Lehrstuhl für Haut- und Geschlechtskrankheiten	SS

M 1.11	Ethics and Philosophy of AI <b>New in SS24</b>		2+0+0+0	5	5			EN	gCA	PHIL	Lehrstuhl für Theory and Ethics of Artificial Intelligence (Alexander von Humboldt-Professur)	SS
M 1.12	Systems Immunology and Infectiology <b>New in WS24</b>	SYSImnf	2+2+0+0	5	5			EN	gCA	MED	Lehrstuhl für Hämatologie / Internistische Onkologie	WS
M 1.13	Seminar und Praktikum zur Biosignalverarbeitung <b>Offered again</b>	BioSigVera	0+0+3+0	5	5			EN/DE	PL	MED	Institut für Physiologie und Pathophysiologie	WS
M 1.14	Medical Device Regulation	MDR	0+0+2+0	2,5	2,5			EN	gCA	FAU MT	Profilzentrum Medizintechnik	WS/SS
M 1.15	Movement neuroscience: connections between the brain and muscles in humans Exercise	MNeuro	2+1+0+0	5	5			EN	gCA	AIBE	Juniorprofessur für Neuromuscular Physiology and Neural Interfacing	WS

<sup>1</sup> Obligatory, if appropriate skills not acquired in the Bachelor programme

Additional medical modules can be used with the agreement of the program director. Please consult with your study advisor beforehand.

M 2 Engineering Core Modules			L+E+S+P	20								
M 2.1	Mechatronic Components and Systems Exercise	MCS	2+2+0+0	5	5			EN	gCA	EEI	Lehrstuhl für Autonome Systeme und Mechatronik	SS
M 2.2 <sup>1</sup>	Robotics 1 Exercise	ROB1	2+2+0+0	5	5			EN	gCA	EEI	Lehrstuhl für Regelungstechnik	SS
M 2.3	Robot Mechanisms and User Interfaces Exercise	RMI	2,5+2,5+0+0	5	5			EN	gCA	EEI	Lehrstuhl für Autonome Systeme und Mechatronik	WS
M2.4	Deep Learning	DL	2+2+0+0	5	5			EN	gCA	AIBE	Lehrstuhl für Informatik 5	WS/SS
M 2.5	Robotics Frameworks	RoF	2+2+0+0	5	5			EN	gCA	MB	Lehrstuhl für Fertigungsautomatisierung und Produktionssystematik	WS
M 2.6	Empirical Research Methods in Medical Engineering	EmpReMed	2+2+0+0	5	5			EN	gCA	AIBE	Professur für Medizinrobotik	SS
M 2.7	Computational multibody dynamics (formely "Computational Dynamics for Robotics")	CDR	2+2+0+0	5	5			EN	gCA	LTD	Lehrstuhl für Technische Dynamik	SS

<sup>1</sup> Obligatory, if appropriate skills not acquired in the Bachelor programme

M 3 Medical Engineering Core Modules			L+E+S+P	20								
M 3.1	Human-centered Mechatronics and Robotics Exercise	HMR	2+2+0+0	5	5			EN	gCA	EEI	Lehrstuhl für Autonome Systeme und Mechatronik	SS
M 3.2	Rehabilitation and Assistive Robotics	RAR	2+2+0+0	5	5			EN	gCA	AIBE	Professur für Medizinrobotik	SS

M 3.3	Human-robot-co-adaption	HRC	3+1+0+0	5	5				EN	gCA	AIBE	Professur für Medizinrobotik	WS
M 3.4	AI in Medical Robotics	AIMedRob	3+1+0+0	5	5				EN	gCA	AIBE	Professur für Intelligente Sensomotorische Systeme	WS

<b>M 4 Advanced Seminar Medical Engineering</b>			<b>L+E+S+P</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>					
Advanced Seminar Medical Engineering			0+0+2+0	5			5		EN	SA		see Seminar Catalogue	WS/SS

<b>M 5 Medical Engineering Specialisation Modules</b>			<b>L+E+S+P</b>	<b>10</b>									
M 5.1	Advanced Upper-Limb Prosthetics Exercise	ULP	2+2+0+0	5	5				EN	gCA	AIBE	Professur für Medizinrobotik	WS
M 5.2	Cognitive Neuroscience for AI Developers Exercise	CNAID	4+0+0+0	5		5	0	0	EN	gCA	INF	Lehrstuhl für Informatik 5 (Mustererkennung)	WS/SS
M 5.3	Body Area Communications	BAC	2+0+0+0	2,5	2,5				EN	gCA	EEI	Lehrstuhl für Technische Elektronik (LTE)	WS
M 5.4	Human Computer Interaction Exercise	HCI	3+1+0+0	5		5	0	0	EN	gCA	INF	Lehrstuhl für Maschinelles Lernen und Datenanalytik (MaD)	SS
M 5.5	Geometric Numerical Integration Exercise	GNI	2+2+0+0	5		5			EN	gCA	MB	Lehrstuhl für Technische Dynamik	SS
M 5.6	Photonics in Medical Technology (formerly "Lasers in Healthcare Engineering")	PIH	2+2+0+0	5	5				EN	gCA	MB	Lehrstuhl für Photonische Technologien (LPT)	WS
M 5.7	Intent Detection and Feedback <b>offered again in SS24</b>	IDF(L)	2+2+0+0	5		5	0	0	EN	gCA	AIBE	Professur für Medizinrobotik	SS
M 5.8	Computational Neurotechnology	Neurotech	2+2+0+0	5		5	0	0	EN	gCA	AIBE	Professur für Sensorische Neurotechnologie	SS

<b>M 6 Medical Engineering Practical Modules</b>			<b>L+E+S+P</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>0</b>					
M 6.1	Academic Laboratory See list on the study program website		0+0+0+4	5			5	0	EN	uCA			WS/SS
M 6.2	Research Laboratory See information on the study program website, and additionally:		0+0+0+4	5			5	0	EN	uCA			WS/SS

M 6.1 + M 6.2	Combinations of M 6.1 and M 6.2:											
Project Pattern Recognition	ProjME	0+0+0+8	10		10		EN	uCA	INF	Lehrstuhl für Informatik 5 (Mustererkennung)	WS/SS	
Project Computer Vision	ProjCV	0+0+0+8	10		10		EN	uCA	INF	Lehrstuhl für Informatik 5 (Mustererkennung)	WS/SS	
Project Innovationslabor für Wearable und Ubiquitous Computing	InnoLabPro	0+0+0+4	10		10		EN	uCA	AIBE	Lehrstuhl für Maschinelles Lernen und Datenanalytik (MaD)	WS/SS	
Project Machine Learning and Data Analytics	ProjMAD	0+0+0+8	10		10		DE/EN	uCA	AIBE	Lehrstuhl für Maschinelles Lernen und Datenanalytik (MaD)	WS/SS	
Virtual and Augmented Reality <b>not offered anymore</b>	VRAR	2+0+0+6	10	10			EN	uCA	AIBE	Juniorprofessur für Human-Centered Computing and Extended Reality	SS	
Project Biomedical Network Science	BIONETS	0+0+0+4	10	10			EN	uCA	AIBE	Juniorprofessur für Daten, Sensoren und Geräte / Digitale Transformation	WS/SS	
Project Representation Learning	PRL	0+0+0+4	10	10			EN	uCA	AIBE	Juniorprofessur für Daten, Sensoren und Geräte / Digitale Transformation	WS/SS	
Computational Imaging	Comp Imag Proj	0+0+0+8	10	10			DE/EN	uCA	AIBE	Professur für Computational Imaging	WS/SS	
The AMOS Project	OSS-AMOS-SD	2+0+0+6	10	10			EN	uCA	INF	Professur für Open Source Software	WS/SS	
Biomedical Image Analysis Project	BIMAP	0+0+0+4	10	10			EN	uCA	AIBE	Juniorprofessur für Artificial Intelligence in Communication Disorders	SS	
Research Project on Surgical Robotics <b>NEW in WS23/24</b>		0+0+0+4	10		10		EN	uCA	AIBE	Surgical Planning and Robotics Cognition (SPARC)	WS/SS	
Projekt Intraoperative Imaging and Machine Learning <b>NEW in WS23/24</b>	IIML	0+0+0+4	10		10		EN	uCA	AIBE	Juniorprofessur für Artificial Intelligence in Medical Imaging	WS	
Project Systems Immunology <b>NEW in WS23/24</b>	Pr_SYSIm	0+0+0+3	10		10		EN	uCA	MED	Lehrstuhl für Hämatologie / Internistische Onkologie	WS/SS	
Neurotechnologie-Projekt	Neurotech Project	0+0+0+8	10	10			EN	uCA	AIBE	Professur für Sensorische Neurotechnologie	WS/SS	

M 7 Flexible Budget Faculty of Engineering			10	0	0	10	0				
Flexible Budget Faculty of Engineering								gCA			
any <b>graded</b> module on Master's level offered by the Faculty of Engineering											
only <u>graded</u> modules of the Faculty of Engineering on Master's level (no conditional subjects)											
Apart from all graded modules on Master's level offered by the Faculty of Engineering, the following modules from the Faculty of Economics can be used for M7:											
Innovation and Leadership	InnLead	4+0+0+0	5		5		EN	gCA	WiSo	Lehrstuhl für Wirtschaftsinformatik, insbesondere Innovation und Wertschöpfung	WS

Service Innovation	ServInn	4+0+0+0	5	5	0	0	0	EN	gCA	WiSo	Lehrstuhl für Wirtschaftsinformatik, insbesondere Innovation und Wertschöpfung	SS
Designing Technology Exercise	InnTec	2+2+0+0	5	5	0	0	0	EN	gCA	WiSo	Lehrstuhl für Wirtschaftsinformatik, insbesondere Innovation und Wertschöpfung	SS
Technology and Innovation Management	TIM	2+2+0+0	5	5	0	0	0	EN	gCA	WiSo	Lehrstuhl für Betriebswirtschaftslehre, insbesondere Industrielles Management	SS
Becoming an innovative engineer	InnoEng	2+0+0+0	2,5	0	0	0	2,5	EN	gCA	AIBE	Lehrstuhl für Maschinelles Lernen und Datenanalytik	WS/SS

<b>M 8 Free Choice Uni</b>			<b>5</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>					
Free Choice Uni any <b>graded</b> lecture / course at the university			5	5	0	0	0		gCA		graded modules of all Faculties	

<b>M 9 Master's Thesis</b>			<b>30</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30</b>					
M 9.1 Master's Thesis			27,5	0	0	0	27,5		PfE		see information on the study program website	
M 9.2 Advanced Seminar Master's Thesis			2,5	0	0	0	2,5					

For M3, you can use modules with a value of max. 5 ECTS credits from the module groups M2 and M5 of your own branch of study or from M2, M3 and M5 of the other branches of study

For M5, you can use modules with a value of max. 5 ECTS credits from the module groups M2 and M3 of your own branch of study or from M2, M3 and M5 of the other branches of study

All lectures can be complemented by additional exercises and practical courses.

**L** Lecture

**E** Exercise

**S** Seminar

**P** Practical course/lab course

**ws** Winter Term

**ss** Summer Term

**PfE** Portfolio Examination

**gCA** graded Course Achievement

**uCA** ungraded Course Achievement

**SA** Seminar Achievement (usually presentation and

**w** written

**o** oral

**online** online (Virtual University Bavaria, VHB, www.vhb.org)

It is possible that in rare cases the exam type is changed. This information must be communicated to the students no later than two weeks after the start of the lecture period and must be documented in the module description in Campo.

**BESCHLUSS Stuko – 13.07.2023**