



EIT

FAKULTÄT FÜR
ELEKTROTECHNIK UND
INFORMATIONSTECHNIK

Faculty of Electrical Engineering and Information Technology

Catalog of Elective Modules

for the Master's program

Medical Systems Engineering

March 6, 2019

Guidelines for elective modules

- (1) Compulsory elective modules must be chosen according to the scope specified in the current study regulations. Overall, the required number of credit points (CP) must be reached or exceeded.
- (2) The elective modules are arranged in deepenings. The deepenings have to be selected according to the following rules:
 - Either: choice of three deepenings. Per deepening choice of modules with a total of 15 CP.
 - Or: choice of two deepenings. A deepening with the choice of modules with a total of 30 CP and a second deepening with the choice of a total of 15 CP.



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



Explanation to the Examination schedule:

LN = Required course certificates (prerequisite)

***** = Depends on the chosen modules

PL = Types of course-related examination achievements

K = written examination

M = oral examination

SA = seminar paper

HA = thesis

EA = experimental work

PRO = research project

R = seminar paper

***** = Depends on the chosen modules

CP = Credit Points

Timing of the course assessment:

During the examination period of the semester in which the course attended.



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



Legende zum Prüfungsplan:

LN = erforderliche Leistungsnachweise (Prüfungsvorleistung)

***** = Abhängig von der Modulwahl

PL = Art der Prüfungsleistung

K = Klausur

M = Mündliche Prüfung

SA = Seminararbeit

HA = Hausarbeit

EA = Experimentelle Arbeit

PRO = Wissenschaftliches Projekt

R = Referat

***** = Abhängig von der Modulwahl

CP = Credit Points = Leistungspunkte

Zeitpunkt der Prüfungsleistung:

Im Prüfungszeitraum am Ende des Semesters, in dem das Modul belegt wurde.

Elective modules

Enrolment: Choice of three deepening. Choice of modules with a total number of 15 CP per deepening. Alternative: Choice of two deepening. Choice of modules with a total number of 30 CP for one deepening and choice of modules with a total number of 15 for a second deepening.

Deepening "Medical Imaging Fundamentals"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Methods of MRI	5	3	V/Ü				5	3	V/Ü	Tutorial certificate	K90
Computed Tomography				10		V/Ü/LP	10		V/Ü/LP		K120
<i>submodule: Methods on Computed Tomography</i>					3	V/Ü		3	V/Ü	Tutorial certificate	----
<i>submodule: Industrial Applications of Computed Tomography</i>					1	V		1	V		----
<i>submodule: Lab course CT</i>					2	LP		2	LP	Lab certificate	----
Introduction into Medical Imaging Technologies	5	3	V/Ü				5	3	V/Ü	Tutorial certificate	K90
Positron Emission Tomography (PET)				5	3	V/Ü	5	3	V/Ü		K90
	10			15			25				

Deepening "Radiation and Medical Physics"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Advances in Radiation and Medical Physics	3	3	V/Ü	2	2	LP	5	5	V/Ü/LP	Lab certificate	K120
Positron Emission Tomography (PET)				5	3	V/Ü	5	3	V/Ü		K90
Nuclear medicine				5	3	V/Ü	5	3	V/Ü		K90
	3			12			15				

Deepening "Medical Visualization and Interventions"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Computer Aided and Image Guided Interventions	8		V/S				8		V/S		SA
<i>submodule: Computer-Assisted Surgery</i>		3	V/S					3	V/S	Seminar certificate	----
<i>submodule: Medical Imaging in Interventional Endovascular Therapy</i>		1	S					1	S	Seminar certificate	----
Visual Analytics in Healthcare	3	2	S				3	2	S		R
Three Dimensional and Advanced Interaction	6	4	V/Ü				6	4	V/Ü		K120
Medical Visualization				5	4	V/Ü	5	4	V/Ü	Tutorial certificate	K120
Human-Computer Interfaces in Medicine				4	2	S	4	2	S		R
	17			9			26				

Deepening "Biomedical Signal Acquisition and Processing"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Electromagnetic Compatibility (EMC)	5	3	V/Ü				5	3	V/Ü		M
Functional Safety for Medical and Technical Systems	5	3	V/Ü				5	3	V/Ü		M
Image Coding	5	3	V/Ü				5	3	V/Ü		M
Machine Learning for Medical Systems	5	4	V/S				5	4	V/S	Seminar certificate	M
Introduction to Deep Learning	6	4	V/Ü				6	4	V/Ü		K120
Computer Vision and Deep Learning				6	4	V/PRO	6	4	V/PRO	Project certificate	M
Digital Information Processing Lab				5	2	S	5	2	S		EA
	26			11			37				

Deepening "Physiological and Biological Systems and Modelling"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Introduction in tissue engineering	5	4	V/Ü				5	4	V/Ü		K90
Mathematical Modeling of physiological Systems	5	3	V/Ü				5	3	V/Ü	Tutorial certificate	M
Theoretical Neuroscience I	5	3	V				5	3	V	Tutorial certificate	K180
Theoretical Neuroscience II				5	3	V	5	3	V	Tutorial certificate	K180
Applied Neuroscience - from study design in motor research to brain-computer-interfaces				5	3	S/LP	5	3	S/LP		EA
	15			10			25				

Deepening "Mechanical- and Flow-Simulation in Medical Engineering"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Computational Biomechanics	5	3	V/Ü				5	3	V/Ü	Tutorial certificate	M
Finite Element Method	5	4	V/Ü				5	4	V/Ü		M
Computational Fluid Dynamics				5	3	V/PRO	5	3	V/PRO		PRO
Microfluidics: Theory and Applications				5	3	V/Ü	5	3	V/Ü	Tutorial certificate	K120
Modeling and Finite Element Simulation with Partial Differential Equations				5	4	V/Ü	5	4	V/Ü		M
	10			15			25				

Deepening "Research Track"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Research Project	5			10			15			Proposal	R
	5			10			15				

Deepening "Medical Microsystems" (currently not offered)	2. Semester			3. Semester			Total			LN	PL
	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		K120
MEMS-Packaging for Medical Solutions				5	3	V/Ü	5	3	V/Ü		K120
Microsystems- and Nano-Technologies for Medical Solutions				5	3	V/Ü	5	3	V/Ü	Tutorial certificate	K120
				20			20				