OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

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

April 25, 2018

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

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

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

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

Timing of the course assessment:

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

Zeitpunkt der Prüfungsleistung:

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

Elective modules

Enrolment: Choice of three deepenings. Choice of modules with a total number of 15 CP per deepening. Alternative: Choice of two deepenings. 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"	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	M
Nuclear medicine				5	3	V/Ü	5	3	V/Ü		K90
Computed Tomography				10		V/Ü/LP	10		V/Ü/LP		K120
submodule: Methods on Computed Tomography					*3*	*V/Ü*		*3*	*V/Ü*	Tutorial certificate	-----
submodule: Industrial Applications of Computed Tomography					*1*	*V*		*1*	*V*		-----
submodule: Lab course CT					*2*	*LP*		*2*	*LP*	Lab certificate	-----
	5			**15**			**20**				

Deepening "Medical Physics and Interventions"	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
Image Guided Surgeries - Biodesign based innovation generation				5	4	V/S	5	4	V/S	Seminar certificate	K120
Methods on Computed Tomography				5	3	V/Ü	5	3	V/Ü	Tutorial certificate	K90
Computer Aided and Image Guided Interventions	8		V/S	2		V	10		V/S		SA
submodule: Computer Assisted Surgery		*3*	*V/S*					*3*	*V/S*	Seminar certificate	-----
submodule: Medical Imaging in Interventional Endovascular Therapy		*1*	*S*					*1*	*S*	Seminar certificate	-----
submodule: Simulation in Medicine and Medical Engineering					*1*	*S*		*1*	*S*	Seminar certificate	-----
	11			**14**			**25**				

Deepening "Biomedical Signals"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Digital Information Processing Lab				5	2	S	5	2	S		EA
EMC of Medical Systems				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
Tomographic Imaging in Medicine	5	3	V/Ü				5	3	V/Ü		M
	10			**10**			**20**				

Deepening "Medical Microsystems"	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**				

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
Computational Fluid Dynamics				5	3	V/PRO	5	3	V/PRO		PRO
Finite Element Method	5	4	V/Ü				5	4	V/Ü		M
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 "Medical Computer Science"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Advanced Security Issues in Medical Systems	5	3	S				5	3	S		M
Bayesian network	5	4	V/Ü				5	4	V/Ü	Tutorial certificate	K120
Human-Computer Interfaces in Medicine				4	2	S	4	2	S		R
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
Medical Visualization				5	4	V/Ü	5	4	V/Ü	Tutorial certificate	K120
Selected Topics in Image Understanding				5	3	V/Ü	5	3	V/Ü		M
	20			**14**			**34**				

Deepening "Neuro-Biology"	2. Semester			3. Semester			Total			LN	PL
	CP	S	A	CP	S	A	CP	S	A		
Applied Neuroscience - from study design in motor research to brain-computer-interfaces				5	3	S/LP	5	3	S/LP		EA
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
	10			**10**			**20**				

Elective Modules - 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**				