# Module Catalog Master Program Medical Engineering

## Study Field "Medical Image and Data Processing"

| Modul Group | Modul Number | Modules: Modul Name (Name of Lecture) | Abbr. | SWS: L+E+S+P | Total Sum: ECTS | 1st Year: WT ECTS | 1st Year: ST ECTS | 2nd Year: WT ECTS | 2nd Year: ST ECTS | Credit Modalities | Department | Lecturer / Responsible Person | WT/ST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M 1** | **Medical Qualification Module** | | | **L+E+S+P** | **10** | **5** | **5** | **0** | **0** | | | | |
| | M 1.1 | Clinical Applications of Optical Technologies and Associated Fundamentals of Anatomy[1] | OMED/CA | 4+0+0+0 | 5 | 0 | 5 | 0 | 0 | 45 o | MED | Prof. Dr. med. Michael Eichhorn | ST |
| | M 1.2 (VHB) | Epidemology / Public Health | | 2+0+0+0 | 2,5 | 2,5 | 0 | 0 | 0 | online | MED | Prof. Dr. Katja Radon | WT/ST |
| | M 1.3 (VHB) | Advanced Occupational Safety and Health | | 2+0+0+0 | 2,5 | 2,5 | 0 | 0 | 0 | online | MED | Prof. Dr. med. Hans Drexler | WT/ST |
| | M 1.4 | Applications of Nanotechnology in Cardiovascular Diseases | HNO 24 | 0+0+2+0 | 2,5 | 0 | 2,5 | 0 | 0 | gC | MED | Prof. Dr. med. Christoph Alexiou, PD Dr. habil. med. Iwona Cicha | ST |
| **M 2** | **Engineering Science Core Module** | | | **L+E+S+P** | **20** | **10** | **10** | **0** | **0** | | | | |
| | M 2.9 | Digitale Signalverarbeitung / Digital Signal Processing Exercise | DSV | 3+1+0+0 | 5 | 5 | 0 | 0 | 0 | 90 w | EEI | Prof. Dr.-Ing. Walter Kellermann | WT |
| | M 2.10[1] | Pattern Recognition | PR | 3+0+0+0 | 5 | 5 | 0 | 0 | 0 | 30 o | INF | Prof. Dr.-Ing. Joachim Hornegger | WT |
| | M 2.11[1] | Pattern Analysis | PA | 3+0+0+0 | 5 | 0 | 5 | 0 | 0 | 30 o | INF | Prof. Dr.-Ing. Elmar Nöth | ST |
| | M 2.12 | Statistische Signalverarbeitung / Statistical Signal Processing Exercise | STASIP | 3+1+0+0 | 5 | 0 | 5 | 0 | 0 | 90 w | EEI | Prof. Dr.-Ing. Walter Kellermann | ST |
| | M 2.21 | Channel Coding Exercise | ChCo | 3+1+0+0 | 5 | 0 | 5 | 0 | 0 | 90 w | EEI | Dr.-Ing. Clemens Stierstorfer | ST |
| | M 2.23 | Geometric Modeling Exercise | GM | 3+1+0+0 | 5 | 5 | 0 | 0 | | 30 o | INF | Prof. Dr. Günther Greiner, Prof. Dr.-Ing. Marc Stamminger, Dr. Roberto Grosso | WT |
| | M 2.24 | Applied Visualization Exercise | AppVis | 2+2+0+0 | 5 | 0 | 5 | 0 | 0 | 30 o | INF | PD Dr.-Ing. Peter Hastreiter | ST |

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| M 2.25 | Transformationen in der Signalverarbeitung / Transformations in Signal Processing | TSV | 2+0+0+0 | 2,5 | 0 | 2,5 | 0 | 0 | 30 | o | EEI | Dr.-Ing. Jürgen Seiler | ST |
| M 2.26 | Principles of Programming Languages<br>Exercise | inf2-popl | 2+2+0+0 | 2,5 | 0 | 2,5 | 0 | 0 | 30 | o | INF | PD Dr. Ronald Veldema | ST |
| M 2.27 | Dependable Embedded Systems (from WT 15/16)<br>Exercise | DES | 2+2+0+0 | 5 | 5 | 0 | 0 | 0 | 30 | o | INF | Prof. Dr.-Ing. Michael Glaß | WT |
| M 2.28 | Elementary Numerical Mathematics<br>Exercise | ElNuMa | 4+2+0+0 | 7,5 | 7,5 | 0 | 0 | 0 | 60 | w | INF | Prof. Dr. Gerhard Wellein | WT |
| M 2.29 | Algorithms of Numerical Linear Algebra<br>Übung | ANLA | 4+2+0+0 | 7,5 | 7,5 | 0 | 0 | 0 | 90 | w | INF | Prof. Dr. Christoph Pflaum | WT |
| M 2.30[2] | Functional Analysis for Engineers<br>Übung | FuncAnEng | 2+2+0+0 | 5 | 5 | 0 | 0 | 0 | 60 | w | INF | Prof. Dr. Christoph Pflaum | ST |

[1] Obligatory, if appropriate skills not acquired in the Bachelor.

[2] Very profound knowledge of mathematics required.

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| **M 3** | **Medizintechnische Kernmodule** | | **L+E+S+P** | **20** | **10** | **10** | **0** | **0** | | | | | |
| M 3.1 | Visual Computing in Medicine | VCMed | 4+0+0+0 | 5 | 2,5 | 2,5 | 0 | 0 | 30 | o | INF | PD Dr.-Ing. Peter Hastreiter,<br>PD Dr. Thomas Wittenberg | WT+ST |
| M 3.2 | Diagnostic Medical Image Processing | DMIP | 3+0+0+0 | 5 | 5 | 0 | 0 | 0 | 30 | o | INF | Prof. Dr.-Ing. habil. Andreas Maier | WT |
| M 3.3 | Interventional Medical Image Processing | IMIP | 3+0+0+0 | 5 | 0 | 5 | 0 | 0 | 30 | o | INF | Prof. Dr.-Ing. habil. Andreas Maier | ST |
| M 3.4 | Biomedizinische Signalanalyse / Biomedical Signal Analysis<br>Exercise | BioSig | 2+2+0+0 | 5 | 5 | 0 | 0 | | 90 | w | INF | Prof. Dr. Björn Eskofier | WT |
| M 3.5 | Computer Architectures for Med. Applications<br>Exercise | CAMA | 2+2+0+0 | 5 | 0 | 5 | 0 | 0 | 30 | o | INF | Prof. Dr.-Ing. Dietmar Fey,<br>Prof. Dr. Gerhard Wellein | ST |
| M 3.7 | Image and Video Compression<br>Exercise | IVC | 3+1+0+0 | 5 | 0 | 5 | 0 | 0 | 90 | w | EEI | Prof. Dr.-Ing. André Kaup | ST |
| M 3.9 | Wavelet-Transformationen in der Bildverarbeitung /<br>Wavelet Transformations in Image Processing<br>Exercise (Theoretical or Practical) | WTBV | 3+1+0+0 | 7,5 | 0 | 0 | 7,5 | 0 | 30 | m | INF | apl. Prof. i. R. Volker Strehl | WT |

| M 4 | Medizintechnische Vertiefungskompetenzen | | L+E+S+P | 10 | 5 | 0 | 5 | 0 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M 4.1 | Innovation Technology | | 2+2+0+0 | 5 | 5 | 0 | 0 | 0 | gC | WISO | Prof. Dr. Kathrin M. Möslein | WT |
| M 4.2 | Interdisciplinary Innovations in Medical Engineering | ININMEN | 0+0+2+0 | 2,5 | 2,5 | 0 | 0 | 0 | uC | ZiMT | Sultan Haider,<br>Dipl.-Ing. Tobias Zobel,<br>Dr.-Ing. Kurt Höller, MBA | WT/ST |
| M 4.3[4] | Seminar Medical Engineering and Ethics, consisting of: | | | 5 | | | 5 | | | | | |
| M 4.3 a | Ethics in Medicine | MEDET | 0+0+2+0 | 2,5 | | 0 | 2,5 | 0 | uC | ZiMT | Dr. Jens Ried, Dr.-Ing. Kurt Höller, MBA | WT/ST |
| Seminar (1 out of 4): | | | 0+0+2+0 | 2,5 | 0 | 0 | 2,5 | 0 | gC | ZiMT | Dr.-Ing. Kurt Höller, MBA | |
| M 4.3 b | Green Hospital | Green Hospital | | | | | | | | | Dr.-Ing. Kurt Höller, MBA, Dipl.-Ing. Tobias Zobel | WT/ST |
| M 4.3 b | Medical Devices of the Future | FutureMD | | | | | | | | | Dr.-Ing. Kurt Höller, MBA, Dipl.-Ing. Tobias Zobel | WT/ST |
| M 4.3 b | Operating Room of the Future | Future OR | | | | | | | | | Dr.-Ing. Kurt Höller, MBA, Dipl.-Ing. Tobias Zobel | WT/ST |
| M 4.3 b | Interventional and Diagnostical Endoscopy | InDiEndo | | | | | | | | | PD Dr. Thomas Wittenberg | WT/ST |

[4] Obligatory

| M 5 | Medizintechnische Vertiefungsmodule | | L+E+S+P | 10 | 0 | 5 | 5 | 0 | | | | |
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| M 5.6 | Software Test and Analysis (Software Verification and Validation)<br>Exercise | SWE-VV | 2+2+0+0 | 5 | 0 | 0 | 5 | 0 | 60 w | INF | Prof. Dr. Francesca Saglietti | WT |
| M 5.1 GPP | Optical Technologies in Life Science | OIC/OTLS | 4+0+0+0 | 5 | 0 | 0 | 5 | 0 | 90 w | WW | Prof. Dr. med. habil. Dr. rer. nat. Oliver Friedrich | WT |
| M 5.2 GPP | Lasers in Healthcare Engineering | LASHE | 2+0+0+0 | 2,5 | 0 | 0 | 2,5 | 0 | 60 w | WW | Ilya Alexeev, Ph.D. | WT |
| M 5.4 GPP | Biomaterials for Tissue Engineering | BioMTE-MT | 2+0+0+0 | 2,5 | 0 | 2,5 | 0 | 0 | 60 w | WW | Prof. Dr. Aldo R. Boccaccini | ST |
| M 5.12 GPP | Integrated Production Systems (Lean Management)<br>Exercise | IPS | 2+2+0+0 | 5 | 0 | 5 | 0 | 0 | 30 m | INF | Prof. Dr.-Ing. Jörg Franke | WT |
| M 5.8 | eBusiness Technologies und Evolutionäre Informationssysteme | EBTEIS | 4+0+0+0 | 5 | 0 | 0 | 5 | 0 | 30 m | INF | Prof. Dr. Richard Lenz,<br>Dr.-Ing. Christoph P. Neumann,<br>Dr.-Ing. Florian Irmert | WS |
| M 5.9 | Human Computer Interaction<br>Exercise | HCI | 3+1+0+0 | 5 | 0 | 5 | 0 | 0 | 90 s | INF | Prof. Dr. Björn Eskofier | SS |
| M 5.10 | Convex Optimization in Communications and Signal Processing<br>Übung | ConvOpt | 3+1+0+0 | 5 | 0 | 0 | 5 | 0 | 30 m | EEI | apl. Prof. Dr.-Ing. Wolfgang Gerstacker | WS |
| M 5.11 | Image Processing in Optical Nanoscopy<br>Übung | IPNano | 1+1+0+0 | 5 | 0 | 0 | 5 | 0 | 30 m | INF | PD Dr.-Ing. habil. Harald Köstler,<br>Dr. Gerald Donnert | SS |

| M 6 | Medical Engineering Practice Competence | | L+E+S+P | 10 | 0 | 0 | 10 | 0 | | | | |
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| M 6.1 | Academic Laboratory | | 0+0+0+4 | 5 | 0 | 0 | 5 | 0 | uC | | Dipl.-Ing. Tobias Zobel | WT/ST |
| M 6.2 | Research Laboratory | | 0+0+0+4 | 5 | 0 | 0 | 5 | 0 | uC | | Dr.-Ing. Kurt Höller, MBA | WT/ST |
| M 6.1 + M 6.2 | Alternative for M 6.1 **and** M 6.2: Flat-Panel CT Reconstruction | ProjFCR | 0+0+0+8 | 10 | | | 10 | | uC | | Prof. Dr.-Ing. habil. Andreas Maier | WT/ST |
| **M 7** | **Softskills** | | | **10** | **0** | **0** | **10** | **0** | | | | |
| M 7.1 | Softskills<br>any **graded** lecture/course at the university | | | 10 | 0 | 0 | 10 | 0 | | | | |
| **M 8** | **Master's Thesis** | | | **30** | **0** | **0** | **0** | **30** | | | | |
| M 8 | Master's Thesis | | | 30 | 0 | 0 | 0 | 30 | | | | |

For M3 you can use max. 5 ECTS points from the module groups M2 to M3 of all branches of study.

For M5 you can use max. 5 ECTS points from the module groups M2 to M5 of all branches of study.

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

**L** Lecture

**E** Exercise

**S** Seminar

**P** Practical Exercise

**WT** Winter Term

**ST** Summer Term

**gC** graded Credit

**uC** ungraded Credit

**w** written

**o** oral

**online** online (Virtual College Bavaria)

BESCHLUSS Stuko 2015-04-20