English Version of Modules – Long Description

Master Electrical Engineering

Category	Content
Name (German)	Advanced Electromagnetic Simulation and Multiphysics
Subtitle	
Name (English)	Advanced Electromagnetic Simulation and Multiphysics
Credit points and total work load	6 180 hours
Contact person	Prof. U. van Rienen
Language	English
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	Numerical Simulation of Electromagnetic Fields

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	- deepening knowledge for science and industrial design - competence to analyze and to solve complex problems in science and engineering
Course contents	- mathematical methods, numerical methods and computational techniques for solving problems of multidisciplinary character in science and engineering - deeper insight in numerical methods like Finite Elements, Boundary Elements and Finite Integration Technique - touching important aspects of multiscale problems - solving practical multidisciplinary problems of industrial and scientific interest
Recommended literature	None

Semester periods per week by type of course	Lecture Tutorial Internship Total	2 SWS 1 SWS 2 SWS 5 SWS	
Titles of the courses			(LSF)
Learning methods	Listening and taking notes, solving problems, self-study, computer experiments		
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study Exam preparation/prerequisites/examination Total work load ** If no further information is given, please account for the notes.*	60 hours 50 hours 50 hours 20 hours 180 hours	

Prerequisites for the final examination (type and	None

extent)	
Test performance/ requirements for a successful examination (type and extent)	1. exam: written examination (60 minutes) 2. exam: practical examination (computer experiments)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350860

Category	Content
Name (German)	Advanced VLSI Design
Subtitle	
Name (English)	Advanced VLSI Design
Credit points and total work load	6 180 hours
Contact person	Prof. Timmermann
Language	English
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	With successful completion of the module the attendees possess skills regarding current trends and developments in the field of integrated systems. Therefore, they possess future-oriented knowledge related to this area of expertise. - Reproduction, understanding, analysis and synthesis: design methods of highly integrated systems, design process of highly integrated systems, optimization of highly integrated systems - Personal and social skills, self-dependence and personal responsibility, cooperation and team work, presentation and communication skills, technical discourse in English
Course contents	- Basic and advanced number representations - Redundant representations - Rounding, overflow and handling - Calculation of expressions - Methods of computational arithmetic ・Addition/subtraction ・Multiplication ・Division ・CORDIC - Applications in digital signal processing and information technology
Recommended literature	http://www.imd.uni-rostock.de/lehre/lehrangebot/prof-d-timmermann/advanced-vlsi-design/

Semester periods per week by type of course	Internship *1 SWS* Total *1 SWS*	
Titles of the courses	Advanced VLSI Design	(LSF)
Learning methods	Team work, laboratory work, and individual technical tasks	
Work load for students	Presence time 30 hours Preparation/processing of presence time 15 hours	

	Practical work	135 hours
	Total work load	180 hours

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: Project report (with presentation)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350870

Category	Content
Name (German)	Aktuelle Themen der Nachrichtentechnik
Subtitle	
Name (English)	Advanced Topics in Digital Communications
Credit points and total work load	6 180 hours
Contact person	Prof. Volker Kühn
Language	English, German *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Basic knowledge of communications engineering

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Expertise - Analysis of communication systems with tools from information theory - Knowledge of state-of-the-art communication systems - Presentation and discussion of scientific questions in the area of digital communications - Presenting and communicating
Course contents	Brief repetition of foundations of digital data transmission (system model, digital modulation) Foundations of information theory - Definition of entropy, mutual information and corresponding interpretation - Channel coding theoreme of Shannon Multi-user communication - Multiple access techniques (TDMA, FDMA, CDMA, SDMA) - Multi-user infomration theory (capacity regions, sum rate, outage) - Multi-user systems and detection algorithms Relay networks - Introduction to relay communications - Relay protocols (AF, DF, CF and related protocols) - capacity bounds
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Seminar 1 SWS Total 4 SWS	
Titles of the courses	Seminar/Aktuelle Themen der Nachrichtentechnik Lecture/Aktuelle Themen der Nachrichtentechnik	(LSF)
Learning methods	Listening and taking notes, self-study, study of literature, giving a presentation, discussing	

Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 40 hours Structured self-study 44 hours Exam preparation/prerequisites/examination 40 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: colloquium (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350880

Category	Content
Name (German)	Ausgewählte Themen im Themenbereich Informationssysteme
Subtitle	
Name (English)	Selected Topics in the Domain of Information Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Andreas Heuer, Prof. Dr. Peter Forbrig, Dr. Anke Dittmar
Language	German, English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Informatik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mathematik - 2015-03-20 M.Sc. Visual Computing - 2014-04-16 M.Sc. Wirtschaftsinformatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each semester

Learning and qualification objectives (competences)	Technical: Foundational knowledge of specific topics in the field of Information Systems, such as administration of non-distributed and distributed amounts of data and documents, connecting database operationedn and processes / workflows as welll as the design of information systems. Methods: Command of essential methods and algorithms in Information Systems. Ability to transfer and apply methods to related problems and fields of computer science. Social: Work organisation in changing group environments. Ability to follow lectures in english. Personal: Ability to judge and select technical topics in Information Systems with respect to individual interest and professional profile.
Course contents	Selected topics from following sub-domains - Avanced data base concepts - Cloud computing - Interaction design - Information & society - Data and processes - Information systems for specific applications - Further topics that are related to new research results
Recommended literature	None

Semester periods per week	Lecture 3 SWS

by type of course	Tutorial 1 SWS Total 4 SWS	
Titles of the courses		(LSF)
Learning methods	Private study	
Work load for students	Attendance time 60 hours Structured self-study 100 hours Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (20 minutes) or written examination (120 minutes) *Will be announced until the second week of classes.*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1150780

Category	Content
Name (German)	Ausgewählte Themen im Themenbereich Modelle und Algorithmen
Subtitle	
Name (English)	Selected Topics in the Area Models and Algorithms
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Karsten Wolf
Language	German or English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Masters programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Informatik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mathematik - 2015-03-20 M.Sc. Visual Computing - 2014-04-16 M.Sc. Wirtschaftsinformatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 Semester
Term	Each semester

Learning and qualification objectives (competences)	Content: Exemplary knowledge in one topic in the area *Models and Algorithms*, e.g.: - Construction, evaluation, or analyis of models - Role of models and algorithms in selected application areas Methods: - Mastering some of the crucial approaches in the area *Models and Algorithms* Social: - Organisation of work in changing working environments - Abaility to comprehend lessons in English Self: - Broader knowledge and capabilities according to individual future plans
Course contents	Selected topics in the following areas: Models: - Construction and evaluation (e.g. validation) of models - Syntax, semantics, and validation of modeling languages Algorithms: - Complex algorithmic patterns (e.g. distributed or parallel algorithms or simulation, approximation in algorithms or simulation, hybrid approaches or simulation) - Advanced algorithmic solutions in various fileds (z.B. graph theory, model checking experiment design, simulation, cryptographie) - Evaluation and analysis of complex algorithms Role of models and algorithms in various application areas (e.g. Ssoftware engineering, systems biology, business, demography, cyber-physical systems) Interaction with other areas in computer science: artificial intelligence, data bases, computer graphics, visual computing, usability Additional topics will emerge from the continuous progress in the field and from

	new research perspectives
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Tutorial 1 SWS Total 4 SWS 1 SWS Exercises or practical training
Titles of the courses	(LSF)
Learning methods	Self-study
Work load for students	Attendance time 60 hours Structured self-study 100 hours Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral exam (20 minutes) or written examination (120 minutes) *To be announced before the second week of the lecture period*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1150790

Category	Content
Name (German)	Ausgewählte Themen im Themenbereich Smart Computing
Subtitle	
Name (English)	Selected Topics in Smart Computing
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Thomas Kirste, Prof. Dr. Peter Luksch
Language	German or English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering – 2015-03-09 M.Sc. Informatik – 2013-07-31 M.Sc. Informationstechnik/Technische Informatik – 2013-09-09 M.Sc. Mathematik – 2015-03-20 M.Sc. Umweltingenieurwissenschaften – 2015-07-03 M.Sc. Visual Computing – 2014-04-16 M.Sc. Wirtschaftsinformatik – 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each semester

Learning and qualification objectives (competencies)	Technical: Foundational knowledge of specific topics of the field of Smart Computing, such as pattern recognition, context analysis, machine learning, smart environments, cooperating ensembles, embedded systems, high-performance computing. Methods: Command of essential methods and algorithms in Smart Computing. Ability to transfer and apply methods to related problems and fields of computer science. Social: Work organisation in changing group environments. Ability to follow lectures in english. Personal: Ability to judge and select technical topics in Smart Computing with respect to individual interest and professional profile.
Course contents	Selected topics form the following areas: - Context analysis and pattern recognition - Intelligent environments - Multimedia communication - Embedded systems - High performance computing - Scalable computing - Additional topics resulting from the advancement of the field and from new research perspectives
Recommended literature	Will be announced in specific lectures

Semester periods per week	

by type of course	Lecture 3 SWS Tutorial 1 SWS Total 4 SWS	
Titles of the courses		(LSF)
Learning methods		
Work load for students	Attendance time 60 hours Structured self-study 100 hours Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (20 minutes) or written examination (120 minutes) *Will be announced at the latest the second week of classes.*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1150800

Category	Content
Name (German)	Automation Technologies
Subtitle	
Name (English)	Automation Technologies
Credit points and total work load	6 180 hours
Contact person	Prof. Dr.-Ing. habil. Kerstin Thurow
Language	English
Admission restriction	Max. 25 students

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Basics of electrical engineering

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Application and analysis: Broadening and deepening knowledge, instrumental expertise and communicative skills Personal and social: Self-dependence and personal responsibility, general study and work techniques, self-organisation, interdisciplinary thinking
Course contents	- Definition of automation and automation technologies - Sensors in automation systems - Actuators in automation systems - Use of robotic components in automation systems - Selected example from industrial automation - Selected examples from laboratory automation
Recommended literature	Nof, S. Y.: Handbook of Automation. Springer, 2009, ISBN-13: 978-3540788300 Considine, D. M.: Standard Handbook of Industrial Automation. Chapman and Hall Advanced Industrial Technology Series. 2013 Fraden, J.: Handbook of modern sensors. Physics, designs, and applications. Springer, 2010, ISBN: 978-1-441-96465-6. Eggins, B.R.: Chemical sensors and biosensors. J. Wiley, 2002, ISBN: 0471899135. Janocha, H.: Actuators. Basics and applications, Berlin, Springer, 2004, ISBN: 3-540-61564-4

Semester periods per week by type of course	Lecture 2 SWS Seminar 2 SWS Total 4 SWS	
Titles of the courses	Seminar "Automation Technologies" Lecture "Automation Technologies"	(LSF)
Learning methods	Lecture: Power Point- and video presentation Seminar: joint work in the lab; autonomous work on seminar tasks; presentation of measuring results (Power Point); practical demonstration Discussion during seminars Self-study of lecture material	

	Self-study of cited literature and materials
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 98 hours Exam preparation/prerequisites/examination 26 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	Solving practical problems and passing the presentation
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes) or written examination (120 minutes) *Will be announced at the latest the second week of classes.*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351360

Category	Content
Name (German)	Bild-/Videoverarbeitung und Codierung
Subtitle	
Name (English)	Image/Video Processing and Coding
Credit points and total work load	6 credit points 180 hours
Contact person	Dr. Henryk Richter
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Signal- und Systemtheorie (Signals and Systems)

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mathematik - 2015-03-20 M.Sc. Visual Computing - 2014-04-16
Connection to subsequent modules	none

Duration	1 Semester
Term	Each winter semester

Learning and qualification objectives (competences)	Ability to apply the necessary information theoretical building blocks for image processing and compression into practical applications Modularization of image/video processing chains Systematic application of metrics toward image/video quality evaluation Development of approaches for image and video compession by example of existing standards Implementation of image processing algorithms in Matlab by elementary operators with the ability to transfer that knowledge to compiler based highlevel languages
Course contents	- Perception, Colors (CIE XYZ/L*a*b,Color Matching/Formats/Conversion) - Sampling / Quantization - Image Transformation - Image Improvement and Restoration - Image Segmentation - Features, Extraction, Descriptors - Pattern Recognition (Basics, Systems for classification, Neural Networks) - Data compression fundamentals - Methods, techniques and algorithms for data compression - Data reduction, Coding, Decorrelation - Image and Video coding standards and their specifics ・JPEG, JPEG-2000 ・Video Coding (H.26x, MPEG-x)
Recommended literature	Gonzalez, R.; Woods, E. : Digital Image Processing, Prentice Hall 2008 Rao K.R.: Techniques & Standards for Image, Video & Audio Coding, Prentice Hall 1996 Mitchell J. L. et al.: MPEG Video Compression Standard. Chapman and Hall 1997 Richardson I.: H.264 and MPEG-4 Video Compression, Wiley & Sons 2003

Semester periods per week	

by type of course	Lecture 3 SWS Tutorial 1 SWS Total 4 SWS	
Titles of the courses		(LSF)
Learning methods	Listening and taking notes, solving problems, self-studies	
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 50 hours Structured self-study 60 hours Exam preparation/prerequisites/examination 14 hours Total work load 180 hours ** If no further information are given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes) or written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350910

Category	Content
Name (German)	Bioenergie und Energieerzeugung aus Abfällen
Subtitle	
Name (English)	Bioenergy and Waste to Energy
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. mont. Michael Nelles
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	The module provides an introductory basic knowledge of the field of the utilization of renewable energy sources and waste and deepens this in several selected areas. The students deepen and expand their knowledge with the help of self-chosen topics and their presentation. Excursions improve the insight into the practical processes; a practical laboratory course imparts the basics concerning the standard analyses for the characterisation of biogenic wastes and residues. The practical laboratory course is associated with one paper which establishes the practical relation between analytical characterisation and engineering. The students are able to evaluate the technical, environmental, economic and social aspects of the processes for the material and energetic utilization of biomass and waste.
Course contents	- Potentials of organic waste and renewable raw materials (organic waste and residues from privat households, industry and commerce as well as from agriculture and forestry (waste wood, forest residues, land scaping residues, biowaste, organic waste from food industry, straw, excrements and litter from animal husbandry as well as products and residues of the energy crop cultivation)) - Technical processes for the material and energy utilization of biomass (production and utilization of solid, liquid and gaseous bioenergy sources) - Ecological, economic and social aspects for the evaluation of the sustainability of the material and energy utilization of biomass (material flow analysis, eco-balance, mircoeconomic and macroeconomic evaluation, - regional labor market effects, etc.) - Objectives of the thermal treatment - Basic processes of the thermal treatment - Standard processes for the waste incineration - Hazardous waste incineration in a rotary furnace - Sewage sludge incineration in a fluidized bed furnace - Alternative processes for the thermal treatment - Waste fuels (high-caloric fraction, refuse derived fuel, solid recovered fuel) - Production of alternative fuels and their possible uses - Quality of RDF
Recommended literature	KALTSCHMITT, MARTIN; HANS HARTMANN; HERMANN HOFBAUER

	(HERAUSGEBER): Energie aus Biomasse: Grundlagen, Techniken und Verfahren; Springer, Berlin; 2009 KALTSCHMITT, MARTIN; WOLFGANG STREICHER; ANDREAS WIESE(HERAUSGEBER): Erneuerbare Energien: Systemtechnik, Wirtschaftlichkeit, Umweltaspekte; Springer, Berlin; 2009 LEITFADEN BIOGAS; Ed. FNR, 2010 BIOKRAFTSTOFFE; Ed. FNR, 2009 ENERGIEHOLZPRODUKTION in der Landwirtschaft; Ed. FNR, 2010

Semester periods per week by type of course	Lecture 2 SWS Tutorial 2 SWS Total 4 SWS	
Titles of the courses	Lecture "Bioenergy and Waste to Energy" Tutorial "Bioenergy and Waste to Energy"	(LSF)
Learning methods		
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 64 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351370

Category	Content
Name (German)	Compact Modeling of Large Scale Dynamical Systems
Subtitle	Model Order Reduction
Name (English)	Compact Modeling of Large Scale Dynamical Systems
Credit points and total work load	6 180 hours
Contact person	IEF/IGS/Mikro- und Nanotechnik elektronischer Systeme
Language	Dr. -Ing. Tamara Bechtold
Admission restriction	Englisch
	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	Successful attendance at the module *Modeling and Simulation of Mechatronic Systems*

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Mechatronik - 2015-03-09
Connection to subsequent modules	Extension of the Module *Finite-Elemente-Methoden und Projekte*

Duration	1 Semester
Term	Each summer semester

Learning and qualification objectives (competences)	Extension and deepening of knowledge in fields of - Modeling and simulation techniques - Linear numeric algebra - System simulation of multi physical technical systems Expertise: - Generating complex descriptions of systems by using compacted numerical models - handling software tools for simulating of complex system models Personal and social: - Consistency check of simulation results - Handling with complex data volume
Course contents	The time dependent behaviour of microsystems, often including coupled physical effects (e.g., mechanical and electrical coupling), is of great importance for their design and application. Through the spatial discretization of the governing partial differential equations, for example using the finite element method, we obtain very large ordinary differential equation systems, which often cannot be solved efficiently. In this lecture students will be introduced to Model Order Reduction Methods, which allow to automatically obtain smaller/compact models, enabling so, efficient but accurate simulation of the same multi-physical phenomena. The methods will be demonstrated on a number of relevant microsystem applications.
Recommended literature	Athanasios C. Antoulas: Approximation of Large-Scale Dynamical Systems, (Society for Industrial and Applied Mathematics), 2005. T. Bechtold, E. B. Rudnyi, J. G. Korvink: Fast Simulation of Electro-Thermal MEMS: Efficient Dynamic Compact Models, (Springer Verlag), 2006. T. Bechtold, G. Schrag, L. Feng (eds), System-Level Modeling of MEMS, (Wiley-VCH Verlag GmbH & Co. KGaA, 2013.

Semester periods per week	

by type of course	Lecture 2 SWS Tutorial 2 SWS Total 4 SWS	
Titles of the courses		(LSF)
Learning methods	Integrated course	
Work load for students	Attendance time 60 Std. Preparation and follow up of the attendance time 60 Std. Structured self-study 40 Std. Exam preparation/prerequisites/examination 20 Std. Total work load 180 Std. ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	Tutorial tasks respectively tasks for programming
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (max. 30 minutes per student – group examination possible as well)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351310

Category	Content
Name (German)	Deutsch für Internationale Masterstudiengänge A1
Subtitle	
Name (English)	German for international Master's courses A1
Credit points and total work load	6 credit points 180 hours
Contact person	Language Center, Head of the German Department
Language	German
Admission restriction	None

Level	Level A1 (CEF)
Mandatory prerequisites	None
Recommended prerequisites	None

Duration	2 semesters
Term	Winter / Summer

Learning and qualification objectives (competences)	The course focuses on the acquisition of basic grammatical structures and correct spelling as well as on practising pronunciation and intonation. Furthermore, the course aims at acquiring basic vocabulary and communication skills enabling students to understand simple texts and to communicate their ideas by using simple structures and a limited range of vocabulary.
Course contents	The course enables students to - cope with familiar everyday situations in their university environment appropriately; - reply to questions and ask for/ provide simple information; - read simple texts written in standard language and dealing with topics they are familiar with; - write simple texts and speak about topics of personal interest they are familiar with and to express their own impressions and opinions. Students learn and practise communication strategies such as paraphrasing, inferring the meaning of unknown vocabulary from the context, and learning strategies, such as using a dictionary.
Recommended literature	None

Semester periods per week by type of course	Language course A1.1.	4 h/ week
	Language course A1.2	4 h/ week
	Total	8 h/ week
Work load for students	Course attendance	118 h
	Preparation	56 h
	Preparation for the examination	6 h
	Total work load	180 h

Prerequisites for the final examination (type and extent)	Regular attendance, at least 80%
Test performance/ requirements for a successful examination (type and extent)	1st Exam: written examination (60-90 minutes) 2nd Exam: oral examination (15 minutes)

Number	9109090

Category	Content
Name (German)	Deutsch für Internationale Masterstudiengänge A2.1
Subtitle	
Name (English)	German for international Master's courses A2.1
Credit points and total work load	6 credit points 180 hours
Contact person	Language Center, Head of the German Department
Language	German
Admission restriction	None

Level	Level A2.1 (CEF)
Mandatory prerequisites	Language skills at level A1 CEF which have to be proven in a placement test or by equivalent certificates
Recommended prerequisites	None

Duration	1 semester
Term	in general, each semester

Learning and qualification objectives (competences)	The course focuses on the acquisition of additional basic grammatical structures and correct spelling as well as practising pronunciation and intonation. Furthermore, the course aims at extending basic vocabulary and communication skills enabling students to understand coherent texts and to communicate their ideas using a limited range of vocabulary.
Course contents	The course enables students to - cope with more complex everyday situations in their university environment appropriately; - reply to questions and ask for/ provide more detailed information; - read texts written in standard language and dealing with topics they are familiar with; - write more complex texts and speak about topics of personal interest they are familiar with and to express their own impressions and opinions. Students continue practising communication strategies such as paraphrasing, inferring the meaning of unknown vocabulary from the context, and learning strategies, such as using a dictionary.
Recommended literature	None

Semester periods per week by type of course	Language course A 2.1.	4 h / week
	Total	4 h / week
Work load for students	Course attendance	56 h
	Preparation	56 h
	Self-study	62 h
	Preparation for the examination	6 h
	Total work load	180 h

Prerequisites for the final examination (type and extent)	Regular attendance (at least 80%) and successful completion of self-study tasks (at least 80%)
Test performance/ requirements for a successful examination	1st Exam: written examination (60-90 minutes) 2nd Exam: oral exam (15 minutes)

(type and extent)	

Number	9109100

Category	Content
Name (German)	Digitale Datenübertragung
Subtitle	
Name (English)	Digital Communications
Credit points and total work load	6 180 hours
Contact person	Prof. Volker Kühn
Language	English, German *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Skills based on the module *Nachrichtentechnik* (1300940, Bachelor)

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Expertise: - Knowledge of state-of-the-art data communication techniques - Ability to apply theoretical knowledge to practical communication systems - Implementation of communication system on a dedicated hardware platform (project) - Organisation and execution of projects - Cooperation and team spirit
Course contents	Brief repetition of foundations of digital data transmission (system model, digital modulation, Matched filter, Nyquist criteria) Frequency-selective channels Transmission strategies for frequency-selective channels - Single-carrier transmission (linear and nonlinear equalization, Viterbi algorithm) – 2nd generation mobile radio systems - Multi-carrier transmission like OFDM – 4th generation mobile radio systems - Spread spectrum transmission (CDMA) – 3rd generation mobile radio systems
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Project 2 SWS Total 5 SWS	
Titles of the courses	Project/Digitale Datenübertragung Lecture/Digitale Datenübertragung	(LSF)
Learning methods	Listening and taking notes, team work, self-study, project work	
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 20 hours Structured self-study 50 hours Exam preparation/prerequisites/examination 40 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351290

Category	Content
Name (German)	Digitale Signalverarbeitung
Subtitle	
Name (English)	Digital Signal Processing
Credit points and total work load	6 180 hours
Contact person	Prof. Sascha Spors
Language	English, German *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Mathematik - 2015-03-20 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Technical: Foundations of discrete and quantized signals and systems. Design and evaluation of algorithms for digital signal processing. Spectral analysis of discrete signals. Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Organisation and implementation of projects - Cooperation and capacity for teamwork - Interdisciplinary thinking
Course contents	- Spectral analysis of deterministic signals - Random signals and LTI systems - Spectral estimation of random signals - Quantization of signals - Realization of non-recursive filters - Realization of recursive filters - Design of digital filters - Multirate systems
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Tutorial 1 SWS Internship 1 SWS Total 5 SWS	
Titles of the courses	Internship/Digitale Signalverarbeitung Lecture/Digitale Signalverarbeitung	(LSF)

	Tutorial/Digitale Signalverarbeitung	
Learning methods	Listening and taking notes, self-study, project work, solving problems, teamwork	
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 40 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 40 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	Successful passing of all lab experiments
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351280

Category	Content
Name (German)	Dynamic Behavior of AC Machines
Subtitle	
Name (English)	Dynamic Behavior of AC Machines
Credit points and total work load	6 180 hours
Contact person	Prof. Eckel
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Knowledge of the steady-state behavior of induction machines and synchronous machines

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Knowledge: - Dynamic behavior of three phase AC machines Application: - Simulation tools for drive systems Analysis: - Dynamic behavior of electric machines - Synthesis, judgement - Simulations models for electric machines Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Cooperation and capacity for teamwork - Scientific discourse in English language
Course contents	Mathematical description of the dynamic behavior of AC machines Modelling of AC machines Simulation of AC machines with Matlab/Simulink Analysis of special operating points
Recommended literature	Leonhard „Control of Electrical Drives“

Semester periods per week by type of course	Lecture 1 SWS Tutorial 3 SWS Total 4 SWS	
Titles of the courses	Tutorial "Dynamic Behavior of AC machines" Lecture "Dynamic Behavior of AC machines"	(LSF)
Learning methods		
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 64 hours Exam preparation/prerequisites/examination 60 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	Solving all simulation problems
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351380

Category	Content
Name (German)	Echtzeitsysteme
Subtitle	
Name (English)	Real-Time Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Dirk Timmermann/Dr. Frank Golatowski
Language	German
Admission restriction	None

Level	Bachelor study course – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Digitale Systeme / Digital Systems

Assignment to curricula	B.Sc. Elektrotechnik - 2012-09-24 B.Sc. Informationstechnik/Technische Informatik - 2012-09-24 B.Sc. Mechatronik - 2015-03-09 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Professional competence: Applicants get introduced into analysis, design, and development of hard real-time systems. Course focusses on algorithms, methods, and programming principles that help to ensure deterministic execution of real-time programs. Technical competence: - Design and analysis of real-time systems Social skills - teach students to individual work on technical topics - promoting personal responsibility - ability to cooperate and work in small teams
Course contents	- Introduction and Terminology - Design and features of real-times systems and real-time operating systems - Design and analysis of real-time systems - Development of real-time systems (co-routine, interrupt systems, forground- and background-systems, real-time operating systems) - Processes, tasks, and threads, interprocess communikaction - Resource management in real-time systems - Semaphore protocols, priority inversion and priority inheritance - Classification of RTOS - RTOS extensions - Real-Time POSIX and POSIX profiles - Real-Time system performance - Schedulinganalysis, performance measurements - Test, Code analysis, worst-case execution time analysis - model-based development of real-time
Recommended literature	Burns and Wellings “Real-Time Systems and Programming Languages” http://www.imd.uni-rostock.de/lehre/lehrangebot/dr-f-golatowski/echtzeitsysteme/

Semester periods per week by type of course	Lecture 2 SWS Seminar 1 SWS Internship 1 SWS Total 4 SWS	
Titles of the courses	Internship/Echtzeitsysteme Seminar/Echtzeitsysteme Lecture/Echtzeitsysteme	(LSF)
Learning methods	Presentations, Self-study	
Work load for students	Attendance time 60 hours Preparation and follow up of the attendance time 40 hours Structured self-study 40 hours Exam preparation/prerequisites/examination 40 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (120 minutes) or oral examination (30 minutes) *Will be announced at the latest the second week of classes.*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1301050

Category	Content
Name (German)	Eingebettete Multi-Prozessor-Systeme
Subtitle	
Name (English)	Embedded Multi-Processor Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Haubelt
Language	German
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	- Ability to rate the performance and efficiency of modern multi-processor system architectures - Ability to rate, apply and extend design methodologies for embedded multi-processor systems with respect to performance and limitations Reproduction, comprehension, application: - Communication synthesis, verification Analysis: - Multi-processor systems architectures, design space exploration Synthesis: - Design methodologies Personal and social: - Self-reliance and personal responsibility
Course contents	Embedded multi-processor systems are optimized with respect to multiple and often conflicting design goals while simultaneously underlying stringent constraints, e.g., area, costs, performance, and energy consumption. The design of such complex systems results in several new problems. In particular, 1) the selection of processors, memories, and communication resources; 2) the hardware/software partitioning of the specification; 3) the automatic synthesis of interfaces and communication resources; 4) the verification. In this module the following topics are covered: - Overview and comparison of architectures for MPSoCs (Multi-Processor System on Chip) and NoCs (Network on Chip) - Methodologies for the design of multi-processor systems ・Hardware/software partitioning / task distribution ・Quality estimation methods ・Performance analysis - Communication synthesis ・Types of communication

	・Synchronization ・Synthesis - Design space exploration - Verification and virtual prototyping
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Tutorial 2 SWS Total 5 SWS	
Titles of the courses	Lecture/Eingebettete Multiprozessorsysteme Tutorial/Eingebettete Multiprozessorsysteme	(LSF)
Learning methods	Active listening and taking notes, self-study, consultation	
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 40 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 40 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350930

Category	Content
Name (German)	Electrical Power Systems - Control and Protection
Subtitle	
Name (English)	Electrical Power Systems - Control and Protection
Credit points and total work load	6 180 hours
Contact person	Prof. H. Weber
Language	English
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Basics on Electrical Energy Technics, Electrical Energy Supply

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Application: - Construction and operation of protection devices Analysis: - Structure and operation of Primary and Secondary Control Systems Personal and social competence: - Independence and self-responsibility - General study and work techniques, self-organisation - Organisation and implementation of projects - Cooperation and capacity for teamwork - Presenting and communicating - Scientific discourse in English
Course contents	Control of power plants and power systems - Modelling of power plants and plant control - Primary control in electrical systems - Secondary control in electrical systems - Tertiary control and marked rules Protection of power systems - Phenomena of switching operation and electric arc - Switching devices - Voltage and current transformer Protection principles and protection units
Recommended literature	None

Semester periods per week by type of course	Lecture Tutorial Internship Total	3 SWS 1 SWS 1 SWS 5 SWS	
Titles of the courses			(LSF)
Learning methods	Listening and Writing, solving problems, self-studies, experiments		
Work load for students	Attendance time Preparation and follow up of the attendance time	70 hours 40 hours	

	Structured self-study 10 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	Successful participation in lab experiments
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350950

Category	Content
Name (German)	Electrical Power Systems - Disturbed Operation
Subtitle	
Name (English)	Electrical Power Systems - Disturbed Operation
Credit points and total work load	6 180 hours
Contact person	Prof. H. Weber
Language	English
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Basics of Electrical Power Engineering, Electric Power Supply

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 Semester
Term	Each summer semester

Learning and qualification objectives (competences)	Application: - Symmetrical Components Analysis: - Disturbed operation of electrical power systems Synthesis: - Equivalent circuits of equipments of electrical power systems Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Cooperation and capacity for teamwork - Scientific discourse in English language
Course contents	- Introduction to symmetrical components - Transformation of three phase systems - Calculation of nonsymmetrical faults - Single pole ground fault - Electrical parameters of overhead lines and cables Mutual interferences in three phase systems
Recommended literature	None

Semester periods per week by type of course	Lecture Tutorial Internship Total	3 SWS 1 SWS 1 SWS 5 SWS	
Titles of the courses			(LSF)
Learning methods	Listening and taking notes, solving problems, self-study, experiments		
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study		70 hours 40 hours 10 hours

	Exam preparation/prerequisites/examination 60 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	Successful participation in experiments
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350960

Category	Content
Name (German)	Electrical Power Systems - symmetrischer Betrieb
Subtitle	
Name (English)	Electrical Power Systems - Symmetrical Operation
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Harald Weber
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Basic knowledge of energy supply, e.g. module „Grundlagen der Elektrischen Energieversorgung

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	- Comprehensive view to the electrical power system - Basic knowledge of the function of the electrical power system in Germany and Europe - Knowledge of the special operational characteristics of the renewable energy supply - Overview of the technical, economical and legal frame requirements of electrical power systems - Insight to the technical and economical optimal operation of electrical power systems - Ability to use all important methods of calculations for electrical power systems, overview of the state of the art software packages
Course contents	- Historical development and future requirements - Structure of the electrical power system - Basics about energy economy and the trade of electrical energy - Structure of the electrical power system, power plants and switch yards - Investment and cost calculations for the electrical power súpply - The electrical power system in symmetrical operation: - Load flow calculation - Operation of a three phase overhead line and cables - Short circuit calculation - State Estimation - Optimal operation of electrical power systems, loss reduction
Recommended literature	VDEW: Die Elektrizitätswirtschaft in der Bundesrepublik Deutschland, VDEW-Verlag Hütte: Taschenbuch der Technik, Elektrische Energietechnik, Band 3 (Netze), Springer-Verlag Handschin: Elektrische Energieübertragungssysteme, ELTEX Studientext, Hüthig

Semester periods per week by type of course	Lecture	3 SWS	
	Tutorial	1 SWS	
	Total	4 SWS	
Titles of the courses	Lecture "Electrical Power Systems - symmetrical operation"		(LSF)

	Tutorial "Electrical Power Systems - symmetrical operation"	
Learning methods		
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 64 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351390

Category	Content
Name (German)	Fehlerdiagnose und Fehlertoleranz in technischen Systemen
Subtitle	
Name (English)	Fault diagnosis and fault tolerance in technical systems
Credit points and total work load	6 180 hours
Contact person	Prof. Torsten Jeinsch IEF/IAT/Chair of Control engineering
Language	German/English
Admission restriction	

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Basic knowledge of mathematical representation of dynamic systems, analysis of dynamic systems and control, e.g. the topics which are discussed in following B.Sc. lectures: - Fundamentals of control engineering - Model-based automation

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	none

Duration	1 semester
Term	Winter semesters

Learning and qualification objectives (competences)	The main objective of this lecture is to cover the applications of control and optimization theory in fault diagnosis and fault-tolerant control of technical systems. The students will become familiar with different approaches to solve the diagnosis and fault-tolerant problems and learn their functionalities and constraints. In addition to the well-developed theories, the open problems and future trends will be discussed in this lecture. During this course, the students should be able apply and evaluate the fault diagnosis and fault-tolerant control in selected applications in maritime systems and automotive industry. Personal and social skills: Independence and self-responsibility, self-organisation, project management and implementation, cooperation and team working, presentation and communication skills, interdisciplinary thinking
Course contents	Applications of model-based and data-driven diagnosis techniques, analysis of the technical systems, parameter estimation, residual generation, synthesis of fault tolerant system are the further topics which are covered in this lecture.
Recommended literature	R.C. Dorf. R.H. Bishop : Modern control systems, 2005 S.X. Ding, Model-based fault diagnosis techniques, 2013 S.X. Ding, Data-driven Design of Fault Diagnosis and Fault-tolerant Control Systems, 2014 M. Baseseville I. Nikiforov: Detection of Abrupt Changes – Theory and Application, 1993. M. Blanke, M. Kinnaert, J. Lunze, M. Staroswiecki, Diagnosis and fault-tolerant control, 2006 E. Russel, L.H. Chiang, R.D. Braatz, Data-driven methods for fault detection and diagnosis in chemical processes, 2000

	R. Isermann: Überwachung und Fehlerdiagnose in technischer Systeme, 1993

Semester periods per week by type of course	Lecture Seminar Internship Total	2 SWS 2 SWS 1 SWS 5 SWS
Titles of the courses		(LSF)
Learning methods	Tutorial, lecture, consultation, internship, seminar	
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study Exam preparation/prerequisites/examination Total work load	70 hours 40 hours 30 hours 40 hours 180 hours

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes) or written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350670

Category	Content
Name (German)	High Voltage and Current Systems
Subtitle	
Name (English)	High Voltage and Current Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Schoenemann
Language	English
Admission restriction	None

Level	Master programme - spezialising
Mandatory prerequisites	None
Recommended prerequisites	Basics of electrical power engineering

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Comprehension: - Beanspruchung elektrischer Komponenten, Application: - Elektrische Kontakte und Verbindungen, Lichtbogen und Plasma Analysis: - Physik des Durchschlagprozesses, Ermittlung elektrischer Felder, Hochspannungsprüf- und Messtechnik, Methodik der Teilentladungsanalyse Evaluation: - Eigenschaften von Isolierstoffen Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Presenting and communicating - Scientific discourse in English language - Interdisciplinary thinking
Course contents	Einführung Hochspannungs- und Hochstromtechnik - Ermittlung und Bewertung elektrischer Felder - Dielektrische Eigenschaften von Isolierstoffen (gasförmig, flüssig, fest) - Hochspannungsprüf- und Messtechnik - eilentladungsanalyse (Methodik, Anwendung) Elektrische Kontakte und Verbindungen - Grundlagen Kontakthysik, Alterungsverhalten, Anwendungen - Thermische Beanspruchung, Auslegungsgrundsätze, Theorie Wärmenetz Lichtbogen und Plasma Schaltlichtbogen
Recommended literature	None

Semester periods per week by type of course	Lecture	3 SWS
	Tutorial	1 SWS
	Internship	1 SWS
	Total	5 SWS

Titles of the courses	Lecture/Einführung Hochspannungs- und Hochstromtechnik	(LSF)
Learning methods	Listening and taking notes, solving problems, self-study, experiments	
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 40 hours Structured self-study 10 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1350980

Category	Content
Name (German)	Hochtemperaturelektronik – Konstruktion und Fertigung
Subtitle	
Name (English)	High Temperature Electronics – Design and Manufacturing
Credit points and total work load	6 180 hours
Contact person	Prof. Nowottnick
Language	German / English
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	basic knowledge of Material Science, Electronic Technology and Electronic Appliances

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Mathematik - 2015-03-20 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	- design of components for high operating temperatures, development of alternative technologies, handling of measuring and test systems, application of quality criteria and compliance with legal regulations Application: - measuring and testing, quality control Analysis: - design for high temperature electronics Synthesis: - development of new technologies Personal and social: - independence and self-responsibility, general learning and work techniques, self-organization, project organization and implementation, presenting and communicating, interdisciplinary thinking
Course contents	application areas of HTE – material selection for HTE – semiconductors for HTE – substrate materials for HTE, cooling concepts – design rules for assemblies – joining technologies for HTE – particularity of manufacturing – processes (master forming, shaping, joining, cutting, coating and changing of material properties) – testing of reliability – environmental aspects (energy consumption, recycling)
Recommended literature	W. Scheel: Electronics Assembly Technology, 2nd Edition, Electrochemical Publications, 2004; lecture notes

Semester periods per week by type of course	Lecture 2 SWS Internship 1 SWS Total 3 SWS	
Titles of the courses		(LSF)
Learning methods	Listening and taking notes, self-study, study of literature, presentation, discussion, trials	
Work load for students	Attendance time 42 hours	

	Preparation and follow up of the attendance time	48 hours
	Structured self-study	28 hours
	Exam preparation/prerequisites/examination	62 hours
	Total work load	180 hours
	** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None	
Test performance/ requirements for a successful examination (type and extent)	1. exam:	report / documentation (research on availability / applications of high temperature electronics/14 hours)
	2. exam:	presentation / questioning (20 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations	
Evaluation	The evaluation depends on the specific examination and study regulations	

Notes	None

Number	1350990

Category	Content
Name (German)	Intelligente Prozessinformationsverarbeitung
Subtitle	
Name (English)	Intelligent Process Information Technologies
Credit points and total work load	6 180 hours
Contact person	Prof. Dr.-Ing. Norbert Stoll, PD Dr.-Ing. habil. Bernd Göde, PD Dr.-Ing. habil. Mohit Kumar
Language	German
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	Modul Grundlagen der Automatisierung
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Application and analysis: - Broadening and deepening knwoledge, instrumental expertise, systemic competencies Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Presenting and communicating - Interdisciplinary thinking
Course contents	- Informationsprozesse mit relativer Nähe zum Stoff- und Energiefluss - Strukturierte PIV-Komponenten zwischen der Feld- und Administrationsebene in komplexen hierarchischen Systemen der Betriebsautomation - Strukturierte Kommunikationssysteme und Telematik der verteilten Prozessinformationsverarbeitung - Internettechnologie und Web Engineering in Lösungen der Prozessinformationsverarbeitung - Potenzial und Grundlagen von Prozessdatenbanken, datenbankgestütztes Informationsmanagement in der verteilten PIV, DBMS als Kommunikationsinstrument kooperierender Rechenprozesse - Datenbankgestützte Prozessaufzeichnungen, Prozessvisualisierung, Verifikationsmethoden für Prozessdatenbankaufzeichnungen - Methoden und Beispiele zur Problemanalyse und Konzeptentwicklung für Projekte des automationsbezogenen Informationsmanagements - Trend zu prozessorientierten Informationssystemen für die Workflowautomation, Prozessanalyse, grafische Modellierung, neue Mittel und Methoden zur Prozessablaufautomation der Workflow-Ebene, standardisierte verallgemeinerte Geschäftsprozessautomation (BPM, BPMS, BPMN), Vergleich mit anderen Ablaufsteuerungs- bzw. -modellierungssprachen der strukturierten Betriebsautomation, Lösungsbeispiele der komplexen Laborautomation - Grundlegende Verfahren und Prinzipien der Artificial Intelligence (neuronale Netze und Fuzzy Methoden) - Algorithmen mit Bezug zu Anwendungen mit Echtzeitbezug - Mathematische Algorithmen zur Extraktion quantifizierbarer

	Information aus komplexen Systemen - Interaktion zwischen verschiedenen Teildisziplinen - Lernalgorithmen für Modellierung und Data Mining - Methoden aus den Bereichen Machine Learning und Stochastik - Beispiele für die Anwendung der Artificial Intelligence
Recommended literature	Steiner, R.: Grundkurs Relationale Datenbanken: Einführung in die Praxis der Datenbankentwicklung für Ausbildung, Studium und IT-Beruf. Vieweg+Teubner Verlag / GWV Fachverlage GmbH, Wiesbaden, 2009 ISBN 978-3-8348-0710-6 Weske, M.: Business process management : concepts, languages, architectures. Springer Verlag Berlin, 2012 ISBN 3-642-28615-1, 978-3-642-28615-5 Baun, C.: Computernetze kompakt. Springer Verlag, 2012. ISBN 978-3-642-28987 Schill, A., Springer, T.: Verteilte Systeme: Grundlagen und Basistechnologien. Springer Verlag Berlin Heidelberg, 2012 ISBN 978-3-642-25796-4 Furrer, F. J.: Ethernet-TCP-IP für die Industrieautomation. Hüthig Verlag, Heidelberg 2000 ISBN 3-7785-2779-7 L. Rutkowski: Computational Intelligence: Methods and Techniques. Springer, 2008. ISBN-13: 978-3540762874 Kruse, R. u.a.: Computational Intelligence: Eine methodische Einführung in Künstliche Neuronale Netze, Evolutionär Algorithmen, Fuzzy-Systeme und Bayes-Netze. Vieweg + Teubner Verlag, 2012, ISBN-13: 978-3834812759

Semester periods per week by type of course	Lecture 2 SWS Seminar 2 SWS Total 4 SWS	
Titles of the courses	Seminar/Intelligente Prozessinformationsverarbeitung Seminar/Intelligente Prozessinformationsverarbeitung Lecture/Intelligente Prozessinformationsverarbeitung	(LSF)
Learning methods	Listening and taking notes, self-study, solving problems, project work	
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 56 hours structured self-study 48 hours Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (90 minutes) or oral examination (30 minutes) *Will be announced at the latest the second week of classes.*
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351000

Category	Content
Name (German)	Interface-Elektronik und Schaltkreisentwurf
Subtitle	
Name (English)	Interface-Electronics and Integrated Circuit Design
Credit points and total work load	6 180 hours
Contact person	Prof. Beikirch
Language	German
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	Basic knowledge of electrical engineering and microelectronic circuits, in-depth knowledge of electronic parts and circuits

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mechatronik - 2015-03-09
Connection to subsequent modules	None

Duration	2 Semesters
Term	Each semester (beginning)

Learning and qualification objectives (competences)	- ability to design / implement robust and reliable signal conditioning and -acquisition (sub-) systems for interface circuits - acquisition of integrated circuit design skills, especially for analogue integrated circuits
Course contents	Modul part 1: Interface Electronics interface-circuits, terms, history, process interfaces: signal conditioning, signal processing chain, signal acquisition techniques, bus interfaces: basic principles, transceiver circuits, transmission lines, field bus systems, serial interfaces Modul part 2: Circuit Design Design of custom analogue and mixed analogue/digital integrated circuits, Standard-cell and full-custom layout, CAD-systems and design automation, Simulation, layout und verifikation of integrated circuits, Exercises on the design of analogue and mixed designs,
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Exercises/tutorial 3 SWS Total 6 SWS	
Titles of the courses	Lecture/Interface-Elektronik und Schaltkreisentwurf – SKE (2 winter, 1 summer) Tutorial/Interface-Elektronik und Schaltkreisentwurf – SKE (1 winter, 2 summer)	(LSF)
Learning methods	Listening and taking notes, solving problems, self-study	
Work load for students	Attendance time 84 hours Preparation and follow up of the attendance time 28 hours Structured self-study 34 hours Practical phase 14 hours	

	Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	1. exam: written examination (90 minutes) 2. exam: project report
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	Practical phase = supervised project work

Number	1351010

Category	Content
Name (German)	Kanalcodierung
Subtitle	
Name (English)	Error Control Coding
Credit points and total work load	6 180 hours
Contact person	Prof. Volker Kühn
Language	English, German *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Knowledge based on the module Nachrichtentechnik (1300940, Bachelor)

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	- Ability to apply information theoretical results onto practical communication systems - Acquisition of knowledge of error control coding in communication systems - Implementation of encoding and decoding algorithms in Matlab
Course contents	Brief repetition of foundations of digital data transmission (system model, digital modulation) Information theory - Entropy, mutual information, chain rule, data processing theoreme - Channel coding theoreme of Shannon Error Correcting Codes - Linear blockcodes - Convolutional codes and Viterbi decoding - Concatenated codes and turbo decoding - LDPC codes and belief propagation decoding - EXIT chart analysis Coded Modulation - Bit-interleaved coded modulation - Multi-level codes Automatic repeat request (type-I and type-II hybrid ARQ)
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Project 2 SWS Total 5 SWS	
Titles of the courses	Project/Kanalcodierung Lecture/Kanalcodierung	(LSF)

Learning methods	Listening and taking notes, teamwork, self-study, projekt work
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 40 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 40 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351020

1301070	Kommunikationssysteme Modullöschung wurde im FR 12/15 beschlossen, muss noch durch den AS Module was decided to get deleted	Dr. Richter

Category	Content
Name (German)	Masterarbeit Electrical Engineering
Subtitle	
Name (English)	Master Thesis Electrical Engineering
Credit points and total work load	30 900 hours
Contact person	Supervisor of Master Thesis
Language	German/English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Topic centred

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 Semester
Term	Each Semester

Learning and qualification objectives (competences)	Expertise: Comprehensive and independent processing of a chosen scientific topic under supervision of a mentor Methods: Literature research Selection and application of appropriate tools and methods for solving the problem Rules of good scientific practise, handling with citation and plagiarism Preparation of a topic in oral and written form Social: Usage of supervision and consultation Ability to present own results Personal: Organisation of an independent scientific work in a predefined period Time management
Course contents	The master thesis is a scientific work created under supervision. It aims to prove the students ability to apply knowledge for solving problems in electrical engineering on the due date. For completing the master thesis 6 months are scheduled.
Recommended literature	Topic centred

Semester periods per week by type of course	Total 0 SWS ** If no further information is given, please account for the notes.*	
Titles of the courses		(LSF)
Learning methods		
Work load for students	Total work load 0 Std. ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None

Test performance/ requirements for a successful examination (type and extent)	1. exam: thesis (20 weeks) 2. exam: colloquium (40 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	none

Number	1351420

Category	Content
Name (German)	Mobilkommunikation
Subtitle	
Name (English)	Mobile Radio Communications
Credit points and total work load	6 180 hours
Contact person	Prof. Tobias Weber
Language	German
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Expertise: - Knowledge of information theoretical basics and their application to problems in the field of mobile radio communications - Knowledge and analysis of stochastic channel models - Familiarity with mobile radio channel modelling techniques - Selection and assessment of approriate transmission techniques for mobile radio applications - Assessment and knowledge of transmission techniques Soft skills: - General study and work techniques, self-organization
Course contents	- system architecture, queueing theory - System modelling - Channel capacity: SISO channel cpapacity, waterfilling, MIMO channel capacity with and without transmitter side channel state information, capacity of stochastic channels - Channel models: linear time variant channels, WSSUS channel model, MIMO channel models - System implementation: OFDM, MIMO transmission techniques, joint detection, joint transmission, channel estimation - Diversity, space-time-coding
Recommended literature	Goldsmith: Wireless Communications, Cambridge, 2005. Molisch: Wireless Communications, Wiley, 2005. Tse, Viswanath: Fundamentals of Wireless Communication, Cambridge, 2005 Kühn: Wireless Communications over MIMO Channels, Wiley, 2006

Semester periods per week by type of course	Lecture 3 SWS Tutorial 2 SWS Total 5 SWS	
Titles of the courses		(LSF)
Learning methods	Listening, taking notes, solving problems, self-study, discussions	

Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 45 hours Structured self-study 40 hours Exam preparation/prerequisites/examination 25 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351230

Category	Content
Name (German)	Modeling and Simulation of Mechatronic Systems
Subtitle	
Name (English)	Modeling and Simulation of Mechatronic Systems
Credit points and total work load	6 180 hours
Contact person	Dr. -Ing. Tamara Bechtold
Language	English
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	Attendees are requested to have the basic topics of mathematics presend that are necessary for the lecture. These are linear algebra and (partial) differential equations.

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Mathematik - 2015-03-20 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Broadening and deepening of knowledge of fields of - Modeling and numerical simulation techniques - Applying simulation tools Competences: - Numerical solution of partial differential equations, finite elements method, finite difference method, method of weighted residuals - Handle industry relevant software tools for the simulation of complex system models, e.g. usage of ANSYS, Simplorer, Maxwell Personal and social: - Consistency check of simulation results - Presentation of project and defence
Course contents	In this lecture the basic methods, as required for the simulation of micro-mechatronic systems, are discussed. Furthermore, a simulation project, using an industry-relevant simulation software, is carried out. Course topics are as follows: 1. Modeling: Partial differential equations, Buckingham Pi-Theorem 2. Meshing of the computational domain 3. Finite difference method for numerical solution of partial differential equations 4. Method of weighted residuals 5. Finite Element Method 6. Solution methods for linear systems 7. Post Processing 8. Application of industry-relevant simulation software
Recommended literature	S. Howison, „Practical Applied Mathematics Modelling, Analysis, Approximation“, Oxford University Press (2004). H. K. Versteeg, W. Malalasekera, „An Introduction to Computational Fluid Dynamics“, Pearson Education Limited, (2nd edition 2007).

	G. Smith, Numerical Solution of Partial Differential Equations: Finite Diference Methods, Oxford University Press, 1985. The Finite Element Method, Volume 1: The Basis, O. C. Zienkiewicz and R. L. Taylor, edited by McGraw-Hill, Oxford (2000). Finite Elements Analysis for Heat Transfer, H. C. Huang, A. S. Usmani, Springer Verlag Berlin Heidelberg (1994)

Semester periods per week by type of course	Lecture 2 SWS Tutorial 1 SWS Project 1 SWS Total 4 SWS	
Titles of the courses		(LSF)
Learning methods	Integrated course	
Work load for students	Attendance time 60 hours Preparation and follow up of the attendance time 60 hours Structured self-study 40 hours Exam preparation/prerequisites/examination 20 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	Preparation and defence of simulation projects
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (150 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351320

Category	Content
Name (German)	Modern Wind Turbines
Subtitle	Technology and economic aspects
Name (English)	Modern Wind Turbines
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Uwe Ritschel
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Technical mechanics and eletrical engineering basics

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Basic understanding of functionality and design of wind turbines; Overview of technolgy of modern wind turbines, normative foundation for the design, and industrial and economic aspect of use of wind energy.
Course contents	Topics covered are: - Introduction: modern wind turbines and future energy supply - Wind as energy resource - History of wind turbines - Rotor blades - Drive train and power system - Tower and foundation - Mechanical models for wind turbines - Aerodynamics of wind turbines - Operation and control concepts - Simulation and Loads - Windfarms and economic aspects - Offshore wind energy - Industrial development and production process
Recommended literature	Erich Hau (2008). Windkraftanlagen: Grundlagen, Technik, Einsatz, Wirtschaftlichkeit (4. Auflage). Springer Robert Gasch, Jochen Twele (2013). Windkraftanlagen: Grundlagen, Entwurf, Planung und Betrieb (8. Auflage). Springer Alois Schaffarczyk (2012). Einführung in die Windenergietechnik. Hanser Tony Burton et al. (2011). Wind Energy Handbook (2. Auflage). Wiley For the books of Hau and Gasch/Twele also English versions are available in the library

Semester periods per week by type of course	Lecture Tutorial Total	2 SWS 2 SWS 4 SWS	
Titles of the courses			(LSF)

Learning methods	
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 34 hours Structured self-study 60 hours Exam preparation/prerequisites/examination 30 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1551420

Category	Content
Name (German)	Numerical Simulation of Electromagnetic Fields
Subtitle	
Name (English)	Numerical Simulation of Electromagnetic Fields
Credit points and total work load	6 180 hours
Contact person	Prof. Dr. Ursula van Rienen
Language	English
Admission restriction	None

Level	Bachelor study course – continuing
Mandatory prerequisites	None
Recommended prerequisites	Mathematik für Elektrotechnik und Informatik 1 und 2, Mathematik für Elektrotechnik 3, Numerik und Stochastik für Ingenieure, Grundlagen der Elektrotechnik 1 - 3

Assignment to curricula	B.Sc. Elektrotechnik - 2012-09-24 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Specialist expertise: - Thorough understanding of the theoretical foundation of numerical methods for the simulation of electromagnetic fields Methodical expertise: - Qualified application of numerical methods as the finite element method, the finite integration technology and the boundary element method - Ability to solve practical problems together with a team with the help of numerical methods (commercial software), document the process and present the results Personal and social: - Independence and self-reliance - General study and work techniques, self-organization - Organization and implementation of projects - Cooperation and capacity for teamwork - Presenting and communicating - Scientific discourse in English language
Course contents	- Exemplary approach of numerical methods as the finite integration, finite elements, and boundary elements to different extents
Recommended literature	None

Semester periods per week by type of course	Lecture 2 SWS Tutorial 1 SWS Project 2 SWS Total 5 SWS	
Titles of the courses	Project/Numerical Simulation of electromagnetic Fields Lecture/Numerical Simulation of electromagnetic Fields Tutorial/Numerical Simulation of electromagnetic Fields	(LSF)

Learning methods	Listening and taking notes, solving problems, self-study, computer experiments
Work load for students	Attendance time 75 hours Preparation and follow up of the attendance time 40 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 35 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	1. exam: written examination (60 minutes) 2. exam: project report (successful project work and concluding presentation)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1301100

Category	Content
Name (German)	Photonische Systeme
Subtitle	Ausgewählte photonische Mess- und Übertragungssysteme
Name (English)	Photonic Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Damaschke
Language	German
Admission restriction	none

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Technische Optik

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Expertise: - Wiedergabe und Verständnis grundlegender Begriffe - Verständnis photonischer Modellvorstellungen - Verständnis und Analyse komplexer optischer und photonischer Erscheinungen und Systeme - theoretische und praktische Synthese und Beurteilung einfacher photonischer Systeme Personal and social: - Umgang mit empfindlichen optischen Komponenten - Beachtung Laserschutzbestimmungen
Course contents	- Optische und photonische Grundbegriffe - Modellvorstellungen: Geometrische Optik, Skalare Beugungstheorie, Elektromagnetiche Wellen, Streutheorien Quantenbeschreibung, Photonen-Materie-Interaktion - Photonische Systeme: Laser, Lichtwellenleiter, Quantenoptik, Photonische Messsysteme, photonische Kristalle, Holographie - Anwendung photonischer Konzepte in Mess- und Übertragungssystemen
Recommended literature	E. Hecht: Optik, Oldenbourg Verlag Albrecht et al.: Laser Doppler and Phase Doppler Measurement Techniques, Springer Verlag Fomin: Speckle Photography for Fluid Mechanics Measurements, Springer Verlag Raffel et al.: Particle Image Velocimetry, Springer Verlag Schnars, Jueptner: Digital Holography, Springer Verlag Lourtioz: Photonic Crystals, Springer Verlag

Semester periods per week by type of course	Lecture Seminar Internship Total	2 SWS 2 SWS 1 SWS 5 SWS	
Titles of the courses			(LSF)
Learning methods	Listening and taking notes, solving problems, self-study, teamwork, giving a presentation, experiments, discussions		

Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 30 hours Structured self-study 50 hours Exam preparation/prerequisites/examination 30 hours Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	Attendance at experiments in internship and seminars
Test performance/ requirements for a successful examination (type and extent)	1. exam: oral examination (30 minutes) 2. exam: presentation (20 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351090

Category	Content
Name (German)	Power Electronics for Electrical Power Supply
Subtitle	
Name (English)	Power Electronics for Electrical Power Supply
Credit points and total work load	6 180 hours
Contact person	Prof. Eckel
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Basic knowledge of power electronics

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Knowledge: - Power electronic topologies and their applications in electrical power generation and distribution. Application: - Dimensioning of power electronic converters Analysis: - Characteristics of different converter topologies Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Cooperation and capacity for teamwork - Scientific discourse in English language
Course contents	- Basic power electronic topologies - Two level and three level voltage source inverters - Application in electrical power generation and distribution
Recommended literature	Mohan, Undeland, Robbins: Power Electronics: Converters, Applications and Design

Semester periods per week by type of course	Lecture 3 SWS Tutorial 1 SWS Total 4 SWS	
Titles of the courses	Lecture "Power Electronics for Electrical Power Supply" Übung "Power Electronics for Electrical Power Supply"	(LSF)
Learning methods		
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 64 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 hours	

	** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: written examination (90 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351400

Category	Content
Name (German)	Programmierbare Integrierte Schaltungen
Subtitle	
Name (English)	Programmable Integrated Circuits
Credit points and total work load	6 credit points 180 hours
Contact person	Dr. Kirchner
Language	English, German
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	Basic skills in analysis and synthesis of analogue and digital electronic circuits.

Assignment to curricula	M.Sc. Computational Science and Engineering - 2015-04-13 M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	2 semesters
Term	Each semester

Learning and qualification objectives (competences)	Competence to implement primarily digital systems into programmable logic devices using different implementation tools and simulators.
Course contents	- Structure of simple and complex Programmable Logic Devices (PLD). - Mapping of digital modules to PLD. - Field Programmable Gate Arrays. - Design input methods. - Hardware Description Languages. - Simulation of digital designs. Functional, Gate-level-, Timing-simulation. - Special problems in digital design. - Practical exercises using CPLD and FPGA.
Recommended literature	Lecture scripts P. Ashenden: The System Designers Guide to VHD-AMS P. Ashenden: Digital Design – An Embedded Systems Approach Using Verilog

Semester periods per week by type of course	Lectures 3 SWS Tutorial 2 SWS Total 5 SWS	
Titles of the courses	Lectures: Lect1: 1 SWS, Lect2: 2SWS Tutorial: Lect1: 1 SWS, Lect2: 1SWS	(LSF)
Learning methods	Listening and taking notes, solving problems, self-study	
Work load for students	Attendance time 70 hours Structured self-study 34 hours Exam preparation/prerequisites/examination 76 hours Total work load 180 hours ** If no further information are given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	Project report
Test performance/ requirements for a successful examination (type and extent)	1st examination: oral examination (20 minutes) 2nd examination: project report (60 hours)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351100

Category	Content
Name (German)	Project Seminar Virtual Acoustics
Subtitle	
Name (English)	Project Seminar Virtual Acoustics
Credit points and total work load	6 180 hours
Contact person	Prof. Sascha Spors
Language	English, German
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	each summer semester

Learning and qualification objectives (competences)	Autonomous familiarisation and preperation of a specific topic from virtual acoustics. Presentation of a complex technical topic in a talk. Preperation of a written summary. Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Organisation and implementation of projects - Presenting and communicating - Scientific discourse in English language
Course contents	Review of literature and presentation of a selected topic in the field of virtual acoustics. Topics from the field of human auditory perception, sound field analysis, binaural synthesis, sound field synthesis and evaluation of spatial audio are handed out at the beginning of the semester.
Recommended literature	None

Semester periods per week by type of course	Lecture Seminar Internship Total	1 SWS 2 SWS 1 SWS 4 SWS	
Titles of the courses			(LSF)
Learning methods	Listening and taking notes, discussion, self-study, solving problems, teamwork, giving presentations, experiments		
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study Exam preparation/prerequisites/examination	56 hours 60 hours 40 hours 24 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None	
Test performance/ requirements for a successful examination (type and extent)	1. exam: 2. exam:	other exam (successful passing of the evaluated practial experiments) presentation (on a selected topic, 30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations	
Evaluation	The evaluation depends on the specific examination and study regulations	

Notes	None

Number	1351110

Category	Content
Name (German)	Projektseminar Eingebettete Systeme
Subtitle	
Name (English)	Project Seminar Embedded Systems
Credit points and total work load	6 180 hours
Contact person	Prof. Haubelt
Language	German, English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each semester

Learning and qualification objectives (competences)	- Independent acquisition of research topics - Conducting literature studies - Giving scientific talks - Writing small research reports Personal and social skills: - Self-reliance and personal responsibility, capacity for teamwork, Presentation and communication
Course contents	The seminar permits a practical training of scientific work in small groups based on a state-of-the-art research topic. Different topics will be provided by research groups at the institute MD.
Recommended literature	None

Semester periods per week by type of course	Seminar 2 SWS Consultation 1 SWS Total 3 SWS	
Titles of the courses		(LSF)
Learning methods	self-study, consultation, giving a talk, project work, literature studies	
Work load for students	Attendance time 42 hours Preparation and follow up of the attendance time 84 hours Exam preparation/prerequisites/examination 54 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and	None

extent)	
Test performance/ requirements for a successful examination (type and extent)	1. exam: Presentation (30 minutes, with subsequent scientific discussion) 2. exam: report (approx. 5-20 pages)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351120

Category	Content
Name (German)	Projektseminar Funkkommunikation
Subtitle	
Name (English)	Project Seminar Radio Communications
Credit points and total work load	6 180 hours
Contact person	Prof. Tobias Weber
Language	English
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	each summer semester

Learning and qualification objectives (competences)	Expertise: - studying and analyzing a specified scientific publication - understanding and describing complex technical backgrounds - carrying out complementary experimental and theoretical investigations - giving a presentation Soft skills: - self-dependence - General study and work techniques, self-organization - cooperation and ability to work in a team - presenting and communicating - scientific discourse in English language
Course contents	Extension of the basic theoretical knowledge in the field of radio communications through a lecture and later application of this theory in a project work done by the students. Anually changing application examples from the areas of multiuser communications, radar technology, radio navigation and metrology will considered. Related to this basics from estimation theory, information theory, microwave technology and communications will be covered by the lecture.
Recommended literature	will be announced in the first lecture

Semester periods per week by type of course	Lecture Internship Total	3 SWS 1 SWS 4 SWS	
Titles of the courses			(LSF)
Learning methods	Listening, taking notes, self studies, experiements, giving a presentation		
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study Exam preparation/prerequisites/examination	56 hours 50 hours 50 hours 24 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: presentation (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351140

Category	Content
Name (German)	Projektseminar Leistungselektronik
Subtitle	
Name (English)	Project Seminar Power Electronics
Credit points and total work load	6 180 hours
Contact person	Prof. Eckel
Language	German, English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	basics of power electronics e.g. “Power Electronic for Electrical Energy Supply”

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Mechatronik - 2015-03-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Application: - Dimensioning of power electronic circuits Analysis: - Operating principle of inverters Synthesis: - Power electronic topologies Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Organisation and implementation of projects - Cooperation and capacity for teamwork - Presenting and communicating
Course contents	Current issues in power electronics for drives, energy generation and energy distribution.
Recommended literature	None

Semester periods per week by type of course	Lecture 1 SWS Seminar 2 SWS Total 3 SWS	
Titles of the courses	Lecture/Seminar Leistungselektronik	(LSF)
Learning methods	Listening and taking notes, asking questions, self-study, teamwork, presenting	
Work load for students	Attendance time 42 hours Structured self-study 10 hours Exam preparation/prerequisites/examination 128 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	1. exam: report (on the conducted project approx. 5-10 pages) 2. exam: presentation (of the conducted project 20 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351150

Category	Content
Name (German)	Radio Navigation and Radar
Subtitle	
Name (English)	Radio Navigation and Radar
Credit points and total work load	6 180 hours
Contact person	Prof. Tobias Weber
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mathematik - 2015-03-20
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Expertise: - application of methodes from estimation theory to problems in the field of radar and localization - knowledge of subspace based spectral estimation methods and their application to direction of arrival and delay estimation - in depth knowledge of the basic localization methods TOA and TDOA - analysis, assessment and synthesis of radar waveforms and by this of radar techniques and localization techniques Personal and social: - General study and work techniques, self-organization - Scientific discourse in English language
Course contents	Estimation theory - basic terms of estimation theory - subspace based estimation techniques (MUSIC, ESPRIT) Radio navigation - TOA- and TDOA-technique - tracking with the Kalman-filter Radar - radar cross section - target detection - radar waveforms - FMC-radar - impulse radar - SAR
Recommended literature	Steven M. Kay: Statistical Signal Processing. Upper Saddle River: Prentice Hall, 1993. NadavLevanon: Radar Principles. New York: Wiley, 1988. Merill I. Skolnik: Introduction to Radar Systems. 3. edition, New York: McGraw-Hill, 2001.

Semester periods per week by type of course	Lecture 3 SWS Tutorial 1 SWS Internship 1 SWS Total 5 SWS	
Titles of the courses		(LSF)
Learning methods	listening, taking notes, solving problems, self studies, experiements	
Work load for students	Attendance time 70 hours Preparation and follow up of the attendance time 36 hours Structured self-study 50 hours Exam preparation/prerequisites/examination 24 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351170

Category	Content
Name (German)	Renewable Energy Sources
Subtitle	
Name (English)	Renewable Energy Sources
Credit points and total work load	6 180 hours
Contact person	Prof. H. Weber
Language	English
Admission restriction	None

Level	Master programme – fundamental
Mandatory prerequisites	None
Recommended prerequisites	Basics of electrical engineering

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Mechatronik - 2015-03-09 M.Sc. Physik - 2015-05-12 M.Sc. Wirtschaftsingenieurwesen - 2013-09-09 M.Sc. Wirtschaftsingenieurwesen - 2015-05-12
Connection to subsequent modules	None

Duration	1 Semester
Term	Each winter semester

Learning and qualification objectives (competences)	- Ability to choose the suitable engery sources regarding the operational conditions - Ability to approximately dimensioning renewable engergy sources to generate electricity Understanding: - Understanding fundamental problem of energy supply Application: - Knowledge of physical and technical basics for the use of renewable energy Analysis: - Composition, construction and mode of operation of facilities for the use of solar and wind energy Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Cooperation and capacity for teamwork - Scientific discourse in English language
Course contents	- Introduction - primary energy sources - energy conversion - Solar energy ・physical principles ・solar thermal systems ・photovoltaics - Wind energy ・Basics ・wind turbines - Power electronics and electrical machines for wind, hydro and solar ・Grid connection

	・Storage technology
Recommended literature	None

Semester periods per week by type of course	Lecture 3 SWS Tutorial 1 SWS Total 4 SWS	
Titles of the courses	Lectures/Renewable Energy Sources Exercises/Renewable Energy Sources	(LSF)
Learning methods	Listening and taking notes, self-study, solving problems	
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 40 hours Structured self-study 24 hours Exam preparation/prerequisites/examination 60 hours Total work load 180 Std. ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351180

Category	Content
Name (German)	Selected Topics in Audio Signal Processing
Subtitle	
Name (English)	Selected Topics in Audio Signal Processing
Credit points and total work load	6 180 hours
Contact person	Prof. Sascha Spors
Language	English, German
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	Expertise: Foundations of sound propagation in rooms. Understanding and application of techniques for the spatial analysis and synthesis of sound fields. Construction and practical limits of microphone and loudspeaker arrays. Personal and social: - Independence and self-responsibility - General study and work techniques, self-organisation - Interdisciplinary thinking
Course contents	This module discusses the foundations and applications of techniques in the field of audio signal processing. The focus is layed on the analysis and synthesis of sound fields with microphone and loudspeaker arrays. The foundations of sound propagation as well as signal processing methods in the context of acoustic systems are discussed. Practical applications are shown and exemplarily implemented in the tutorial.
Recommended literature	None

Semester periods per week by type of course	Lecture 2 SWS Tutorial 2 SWS Total 4 SWS	
Titles of the courses	Lecture/Ausgewählte Themen der Audiosignalverarbeitung Tutorial/Ausgewählte Themen der Audiosignalverarbeitung	(LSF)
Learning methods	Listening and taking notes, self-study, solving problems, teamwork	
Work load for students	Attendance time 56 hours Preparation and follow up of the attendance time 54 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 40 hours	

	Total work load 180 hours ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351190

Category	Content
Name (German)	Selected Topics in Embedded Systems Design
Subtitle	
Name (English)	Selected Topics in Embedded Systems Design
Credit points and total work load	6 180 hours
Contact person	Prof. Haubelt
Language	English
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	- Knowledge of evolution and trends in the embedded systems area - Reproduction, comprehension, application, and analysis: - Embedded systems architectures, design methods for embedded systems, verification methods for embedded systems - personal and social skills:: - self-reliance and personal responsibility
Course contents	Modern developments and trends in the domain of embedded systems permanently result in a multitude of novel and interesting topics. Within this module, such topics are addressed. The objective of this module lies in picking up new ideas and concepts in the embedded systems domain. Hence, leading edge research topics in the scope of the Chair of Embedded Systems can be taught, discussed and rated. A particular focus is on embedded systems architectures, design methods for embedded systems, and verification methods for embedded systems. The precise topic of the module will be defined at start of term.
Recommended literature	None

Semester periods per week by type of course	Lecture Tutorial Total	3 SWS 1 SWS 4 SWS	
Titles of the courses			(LSF)
Learning methods	listening and taking notes, consultation		
Work load for students	Attendance time Preparation and follow up of the attendance time Structured self-study Exam preparation/prerequisites/examination Total work load ** If no further information is given, please account for the notes.*	56 hours 40 hours 44 hours 40 hours 180 hours	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	Exam: oral examination (30 minutes)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351200

Category	Content
Name (German)	Selected Topics in VLSI Design
Subtitle	
Name (English)	Selected Topics in VLSI Design
Credit points and total work load	6 180 hours
Contact person	Prof. Timmermann
Language	English
Admission restriction	None

Level	Master programme – specialising
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each winter semester

Learning and qualification objectives (competences)	- Reproduction, Comprehension, Analysis: - Current challenges, development, and optimization of integrated systems, Optimierungen integrierter Systeme - Selbst- und Sozialkompetenz - Selbständigkeit und Eigenverantwortlichkeit, Präsentieren und Kommunizieren
Course contents	In this module, students will learn in small teams how to develop a CMOS based integrated system from the ground up. Starting with a specification in the hardware description language VHDL a typical design is simulated and imöented in different design phases. Starting from a field programmable device (FPGA) the design is further refined to an application specific integrated cicuit (ASIC) and optimized in terms of area, cost, performance, and energy. The course is run in a competetive manner and best results will be awarded.
Recommended literature	None

Semester periods per week by type of course	Seminar 1 SWS Total 1 SWS	
Titles of the courses	Seminar/Selected Topics in VLSI Design	(LSF)
Learning methods	Listening and taking notes, self-study, project work, discussion	
Work load for students	Attendance time 15 hours Preparation and follow up of the attendance time 15 hours Structured self-study and lab work 150 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and	None

extent)	
Test performance/ requirements for a successful examination (type and extent)	Results of bi-weekly presentions and lab results will be aggregated to an overall examination evaluation. No dedicated exam.
Regular examination date	None
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351210

Category	Content
Name (German)	Spezialisierung Electrical Engineering
Subtitle	
Name (English)	Specialisation Electrical Engineering
Credit points and total work load	18 540 hours
Contact person	Supervisor of module for specialisation
Language	German/English *Will be announced until the second week of classes.*
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	Topic centred

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each semester

Learning and qualification objectives (competences)	Expertise - Comprehensive processing of a chosen scientific topic under supervision Methods: - Literature research - Selection and application of appropriate tools and methods for solving the problem - Rules of good scientific practise, handling with citation and plagiarism - Preparation of a topic in oral and written form Social: - Usage of supervision and consultation - Ability to present own results Personal: - Organisation of an independent scientific work in a predefined period
Course contents	Within the specialisation module a problem has to be solved in the course of a semester. It aims to introduce into a specific field. The topic is directed by the supervisor. The given problem is analysed by the students with the support by the supervisor. The current state of research as well as possible solving strategies have to be studied from literature. A solution has to be implemented and evaluated. Finally, the results have to be presented.
Recommended literature	Topic centred

Semester periods per week by type of course	Internship 0,5 SWS Total 0,5 SWS	
Titles of the courses		(LSF)
Learning methods		
Work load for students		

	Total work load 0 Std. ** If no further information is given, please account for the notes.*

Prerequisites for the final examination (type and extent)	*None*	
Test performance/ requirements for a successful examination (type and extent)	1. exam:	report/documentation (max. 20 pages) Weighted results: 80 %
	2. exam:	colloquium (40 minutes) Weighted results: 20 %
Regular examination date	The regular examination date depends on the specific examination and study regulations	
Evaluation	The evaluation depends on the specific examination and study regulations	

Notes	This module is inteded for the acquirement of necessary skills required for the master thesis especially for those students who haven't yet written a thesis at the University of Rostock.

Number	1351410

Category	Content
Name (German)	Verteilte eingebettete Systeme
Subtitle	
Name (English)	Network Embedded Systems
Credit points and total work load	6 180 hours
Contact person	Dr. Golatowski
Language	German
Admission restriction	None

Level	Master programme – continuing
Mandatory prerequisites	None
Recommended prerequisites	None

Assignment to curricula	M.Sc. Electrical Engineering - 2015-03-09 M.Sc. Elektrotechnik - 2013-07-31 M.Sc. Informationstechnik/Technische Informatik - 2013-09-09 M.Sc. Mechatronik - 2015-03-09
Connection to subsequent modules	None

Duration	1 semester
Term	Each summer semester

Learning and qualification objectives (competences)	Reproduction, understanding, application and analysis: - Embedded processors, wireless radio technologies , wireless sensor networks (WSN), localization and routing in ad hoc and sensor networks, Internet of Things (IoT) Personal and social competence : - Independence and self-responsibility, general study and work techniques, self-organization, project organization and implementation, cooperation and teamwork, present and Communicate
Course contents	This course provides knowledge of basic concepts, algorithms and architectures of distributed embedded systems and sensor networks. It considers programming concepts of distributed embedded systems , the design of distributed embedded systems, which are particularly characterized by low energy consumption and are usually equipped with a wireless interface. In associated exercises the knowledge of the design of distributed systems is deepened and a complex application will be designed and implemented. - Overview of embedded mircoprocessors. - Low Power MCUs, performance MCUs, Wireless MCUs - Architecture, components, and programming of microcontrollers - Wireless Networks (802.15.4 , 6LoWPAN , Bluetoth, ZigBee) - Sensor network platforms - Development systems, architecture - Base stations, gateways and nodes - Selected problems in sensor networks - Localization and routing in ad hoc and sensor networks - Algorithms - classifications - Software for Sensor Networks - Operating systems, hardware abstraction layer, middleware and service-

	oriented architecture - Applications of sensor networks - Internet of Things
Recommended literature	William Kaiser and Greg Pottie: Principles of Embedded Networked Systems Design, Cambridge University Press, 2005, ISBN 0521840120 Wayne Wolf: Computers as Components, Principles of Embedded Computing System Design, Morgan Kaufmann Publishers, 2. Aufl., 2008, ISBN 978-0123743978 Edgar H. Callaway: Wireless Sensor Networks, Architektur and Protocols (Internet and Communication Series), CRC Press, 2003, ISBN 0849318238 Holger Karl, Andreas Willig: Protocols and Architektures for Wireless Sensor Networks, John Wily & Sons, 2007, ISBN 978-0470519233 Jose A. Gutierrez, Ludwig Winkel, Edgar H. Callaway: Low-Rate Wireless Personal Area Networks: Enabling Wireless Sensors with IEEE 802.15.4, John Wiley & Sons, 3. Auflage, 2011, ISBN:978-0738162850 I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci: A survey on sensor networks, IEEE Communications Magazine, 40 (8) (2002), pp. 104–112

Semester periods per week by type of course	Lecture 2 SWS Tutorial 2 SWS Total 4 SWS	
Titles of the courses	Course/ Network Embedded Systems Seminar/ Network Embedded Systems	(LSF)
Learning methods	Listening and taking notes, self-study, developing a small project as part of the exercise	
Work load for students	Attendance time 60 hours Preparation and follow up of the attendance time 60 hours Structured self-study 30 hours Exam preparation/prerequisites/examination 30 hours Total work load 180 hours ** If no further information is given, please account for the notes.*	

Prerequisites for the final examination (type and extent)	None
Test performance/ requirements for a successful examination (type and extent)	1. exam: oral exam (30 Minuten) 2. exam: presentation (30 Minuten)
Regular examination date	The regular examination date depends on the specific examination and study regulations
Evaluation	The evaluation depends on the specific examination and study regulations

Notes	None

Number	1351220