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Module Handbook

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(Last Update Winter term 2024)

for the Study Programs

Computer Visualistics (B.Sc. & M.Sc.), Computer Science (B.Sc. & M.Sc.), Bilingual Computer Science (B.Sc.), Engineering Informatics (B.Sc. & M.Sc.), Business Informatics (B.Sc. & M.Sc.), Digital Engineering (M.Sc.), Data and Knowledge Engineering (M.Sc.) and Visual Computing (M.Sc.)

at the

Otto-von-Guericke-University Magdeburg
Faculty of Computer Science

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Part A of this MHB contains the description of all modules that will be taught in the winter semester 2024/2025; these descriptions correspond to the new presentation scheme for FIN modules.

Part B of this MHB contains the description of all other FIN modules that are available for examination and semester planning. These descriptions currently correspond to the old presentation scheme for FIN modules.
(Overview of all modules)

Please note when planning the coming semesters: Part B will be adapted in the coming summer semester.

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to **Table of Contents Part B**

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Module Handbook
Part A

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for the Study Programmes

Computer Visualistics (B.Sc. & M.Sc.),
Computer Science (B.Sc. & M.Sc.),
Bilingual Computer Science (B.Sc.),
Engineering Informatics (B.Sc. & M.Sc.),
Business Informatics (B.Sc. & M.Sc.),
Digital Engineering (M.Sc.),
Data and Knowledge Engineering (M.Sc.)
and
Visual Computing (M.Sc.)

OTTO VON GUERICKE
UNIVERSITÄT
MAGDEBURG

at the
Otto von Guericke University Magdeburg
Faculty of Computer Science
from winter semester 2024

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Table of Contens Part A

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Module Name:	Adaptronik
Engl. module name:	Adaptronik
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 3rd/4th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Michael Sinapius, IFME
Lecturer(s):	Prof. Dr. Michael Sinapius, IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; practical course
Workload:	Attendance times: weekly 2 h (lecture) and practical course Independent processing of experiments, preparation of test protocols, presentation of results
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Principles of Adaptronik (BA programme)
Intended learning outcomes:	Adaptronik creates a new class of technical, elastomechanical systems that can automatically adapt to a wide range of environmental conditions by using new activatable materials and fast digital controllers. Adaptronik has 4 target fields of technical applications: Contour adaptation through elastic deformation Vibration reduction through structure-borne sound interference Noise reduction through active measures Increased service life through structure-integrated component monitoring Using the interdisciplinary research field of Adaptronik, students should learn and practise interdisciplinary thinking in the engineering sciences, as is typical for the engineering profession. Adaptronik combines knowledge and skills in materials science, mechanical engineering, electrical engineering and control engineering. The exercises are carried out as laboratory exercises. In the practical course, students solve complex tasks independently, the successful completion of which is a prerequisite for admission to the examination.
Contents:	Overview of Adaptronik, applications from research Structure-integrated sensors and actuators Structure-compliant integration of actuators and sensors Contour adjustment target field: Morphing methods. Target field Vibration suppression: structure-borne sound interference, cancellation, compensation

	Target field of noise reduction: concepts of active noise reductionAutonomous systems - concepts of energy harvestingConcepts of integrated component monitoring Regulation Reliability / Robustness Accompanying laboratory practical: Independent execution of experiments on Adaptronik measurements, evaluation and presentation of the results
Type of Examination:	Participation in the laboratory, oral examination
Media:	
Literature:	

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Module Name:	Advanced Topics in Networking
Engl. module name:	Advanced Topics in Networking
Abbreviation:	ATN
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 4th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. David Hausheer
Lecturer(s):	Prof. Dr. David Hausheer
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. BiBaINF - Study profile - Web founder FIN: B.Sc. BiBaINF - Key and methodological competences FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	for Bachelor: - Lectures (28h) - Theoretical exercises (22h) - Practical exercises (6h) - Homework (96h) for masters: - Lectures (28h) - Practical exercises (6h) - Homework (146h) Preparation for the final exam
Credit points/ECTS:	Bachelor: 5 credit points = 150h (56h contact hours + 96h self-study) Grades according to examination regulations Master: 6 credit points = 180h (34h contact hours + 146h self-study) Grades according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	The lecture Computer Networks is recommended

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Intended learning outcomes:	Students gain an in-depth insight into various advanced topics in the field of networks.
Contents:	The course covers advanced topics from the field of networks, including:Overlay networks for content delivery, e.g. P2P, BitTorrent, CDNs, caching, overlay video streamingDistributed Hash Tables (DHT), e.g. KademliaBlockchainsCryptocurrencies and BitcoinEthereum and Smart ContractsSecure network architectures, e.g. SCIONCongestion Control, e.g. QUIC and Multipath-QUIC
Type of Examination:	Written examination
Media:	
Literature:	Textbooks according to announcement. Lecture slides and copies of articles as required.

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Module Name:	Algorithm Engineering
Engl. module name:	Algorithm Engineering
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise; Project
Workload:	Attendance times: 4 SWS Lecture Independent work: Follow-up of lectures, project 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basic knowledge of algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired competences: The aim of algorithm engineering is to bridge the gap that often exists between the theory and practice of algorithm design by closely linking design, analysis, implementation and experimentation. Ability to apply the methods of algorithm engineering. Ability to design and carry out computer experiments to analyse algorithms
Contents:	Gap between theory and practice of algorithm design, experimental algorithms, realistic computer models, C++ software libraries, certifying algorithms, case studies.
Type of Examination:	Examination prerequisite: Completion of the project (case study) Exam: oral

Media:	
Literature:	Müller-Hannemann, Schirra (eds): Algorithm Engineering, Springer LNCS 5971 C. McGeoch: Algorithm Engineering

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Module Name:	Allgemeine Elektrotechnik
Engl. module name:	Electrical engineering and electronics
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Electrical Engineering / Electrical Actuators, Professorship of Power Electronics
Lecturer(s):	Prof. Dr Andreas Lindemann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Electrical Engineering FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching Method / SWS:	Lecture; Exercise; Practical course
Workload:	Attendance times: 3SWS Independent work: 3SWS
Credit points/ECTS:	10
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics I-II, Physics
Intended learning outcomes:	Learning objectives and competences to be acquired: Acquisition of the knowledge and skills required to understand electrical engineering contexts
Contents:	The course is aimed at students of non-electronic degree programmes and teaches application-related basic knowledge. The following topics are covered in lectures, exercises and laboratory practicals: Basic quantities of electrical engineering Calculation of direct current circuits Electric and magnetic field Alternating current technology Introduction to semiconductor technology and electronic circuits Basics of digital technology Design and operating principles of electrical machines Measurement of electrical quantities
Type of Examination:	Exercise certificate, internship certificate, written exam
Media:	
Literature:	R. Busch: Elektrotechnik und Elektronik, Teubner Vlg. 2003

	U. Seidel, E. Wagner: Allgemeine Elektrotechnik, Hanser Vlg. 1999

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Module Name:	Allgemeine Psychologie II
Engl. module name:	General Psychology II
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Stefan Pollmann
Lecturer(s):	Prof. Dr. Stefan Pollmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Psychology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing possibly as General Psychology II/1 and II/2
Teaching Method / SWS:	Lecture
Workload:	2 lectures, one hour each Attendance time: 2 SWS (28 hours), study time: 92 hours. Total: 120 hours 2CP each per lecture (can also be billed individually)
Credit points/ECTS:	4
Prerequisites according to examination regulations:	
Recommended prerequisites:	General Psychology I
Intended learning outcomes:	Students learn about general psychological relationships in the areas of learning, memory, motivation, emotion and volition and their neuroscientific foundations. The course content should provide them with the knowledge and skills to understand further psychological issues in the basic and advanced modules. Based on these fundamentals, students should be able to apply the subject-specific skills they have acquired to applied issues.
Contents:	General Psychology II/1: Learning Memory General Psychology II/2: Motivation Emotion Volition
Type of Examination:	Exams at the end of each semester.
Media:	
Literature:	

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Module Name:	Alternative Energien / Regenerative Elektroenergiequellen
Engl. module name:	Alternative Energien / Regenerative Elektroenergiequellen
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	3 SWS = 150h (42h attendance time +108h independent work) Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Regelungstechnik, Steuerungstechnik, Ereignisdiskrete Systeme
Intended learning outcomes:	Learning objectives and acquired competences: The course imparts knowledge of energy generation from renewable energy sources. Students learn about the most important renewable energy sources: Solar energy, hydropower, wind power and biomass and the utilisation possibilities of the regenerative energy potentials available are demonstrated. They will also learn about energy storage, fuel cells and the problems of integrating renewable energy systems and energy storage into the grid.
Contents:	Introduction, electrical energy systems, energy terms Basics of renewable energy supply, energy balance Photovoltaic power generation Electricity generation from wind power Electricity generation from hydropower Fuel cells Electrical energy storage Grid operation of local energy producers
Type of Examination:	Oral examination
Media:	
Literature:	

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Module Name:	Anatomie und Physiologie
Engl. module name:	Anatomy and Physiology
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Friedemann Awiszus (teaching import from the FME)
Lecturer(s):	Prof. Dr. Friedemann Awiszus (teaching import from the FME)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology
Teaching Method / SWS:	Lecture
Workload:	2 SWS 150h (28h attendance time in the lecture 122h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The module focuses on the development of scientific principles in the theoretical fields of anatomy, physiology and sports and performance medicine. Students acquire basic knowledge of the structure and function of organ systems, taking into account the stress and strain of physical activity. Basic knowledge from the fields of biomechanics and functional anatomy as well as performance physiology is taught for the planned and controlled organisation of exercise, play and sport in the various fields of activity (recreational sport, competitive sport, health and rehabilitation sport and sport for people with disabilities).
Contents:	Biological basics and basics of the musculoskeletal system Descriptive and functional anatomy of the passive and active musculoskeletal system Anatomy and physiology, function and mode of operation of the various organ systems (cardiovascular and respiratory system, blood and immune system, endocrine system, nervous system, urinary tract, digestive system, sensory organs) Basics of energy metabolism Neurophysiological basics of motor skills
Type of Examination:	Written exam (90 minutes)
Media:	
Literature:	
Module Name:	Angewandte Bildverarbeitung
Engl. module name:	Angewandte Bildverarbeitung
Abbreviation:	ABV
Notes:	

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Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Neuro-Information Technology, Professorship of Computer Engineering
Lecturer(s):	Prof. Dr.-Ing. habil. Ayoub Al-Hamadi
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology
Teaching Method / SWS:	Internship; Seminar
Workload:	Attendance times: Summer semester: 2 SWS seminar Winter semester: 1 SWS seminar + 1 SWS software project Independent work: Project work (presentation preparation + software preparation)
Credit points/ECTS:	7 credit points = 210h (56h attendance time + 154h independent work) Grading scale according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	Grundlagen der Bildverarbeitung (FIN), Signalorientierte Bildverarbeitung (FEIT)
Intended learning outcomes:	Learning objectives & competences to be acquired: Students should deepen and practically apply their knowledge in the field of applied image processing by means of given or possibly self-chosen special topics
Contents:	The course covers special topics, for example from current research in the field of image processing. These topics include image correction, 3D measurement, image sequence processing, facial analysis, information fusion, neural networks, biological and medical applications. In the first part, groups prepare a presentation on a specific topic, which is then given to the seminar participants. In the second part, a practical software realisation of special image processing problems is carried out. This also serves to deepen programming skills.
Type of Examination:	Oral exam: cumulative: lectures & 1 software solution
Media:	
Literature:	see script

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Module Name:	Applied Discrete Modelling
Engl. module name:	Applied Discrete Modelling
Abbreviation:	ADM
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Claudia Krull
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise; Project
Workload:	180 hours (56 h attendance time + 124 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Maths for engineers Programming skills
Intended learning outcomes:	Participants are familiar with Markov chains and selected applications and solution methods Participants are familiar with non-Markovian stochastic processes and can model and simulate them in different ways The participants know hidden Markovian and non-Markovian processes The participants know selected research topics of the chair Participants will be able to implement the models and methods they have learnt and apply them to problems from the university's main research areas, particularly medicine and engineering
Contents:	Discrete-time and continuous-time Markov chains Applications and programming of calculation methods for Markov chains Method of additional variables Proxel simulation and phase distributions Modelling with hidden models

	Programming of solution methods for different model classes Modelling and solving problems in medicine and engineering
Type of Examination:	Examination prerequisite Graded: Oral examination
Media:	
Literature:	See www.sim.ovgu.de

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Module Name:	Ausgewählte Algorithmen der Computergraphik
Engl. module name:	Selected Algorithms in Computer Graphics
Abbreviation:	AACG
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship Visual Computing
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercise Independent work: Work on exercises and programming tasks 180 h = 56 h attendance time + 124 h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge of basic and advanced methods of geometry processing Ability for practical application
Contents:	Linear least-squares approximation Data interpolation and approximation Matrix factorisation, sparse matrices Regularisation General applications and case studies
Type of Examination:	Completion of the exercises is necessary to obtain admission to the examination Exam: oral
Media:	
Literature:	

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Module Name:	Automatisierungssysteme
Engl. module name:	Automatisierungssysteme
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Christian Weber (FEIT-IFAT) / Dr Peter Eichelbaum (FEIT-IFAT)
Lecturer(s):	Prof. Dr. Christian Diedrich
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation 3 SWS = 150h (42h attendance time +108h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science
Intended learning outcomes:	Learning objectives and competences to be acquired Models and methods for handling automation systems Interaction and co-operation strategies of automation systems Integration technologies Principles of procedural and descriptive description methods for technical systems
Contents:	Modern information and knowledge-processing systems are used in automation technology. The proximity of automation to the dynamic processes of machines and production plants requires specific models and methods for their analysis, design and operation, which are presented in this module. Automation systems are made up of a large number of components that have to interact with each other. These components must therefore be integrated in terms of their information exchange. Technologies from both the IT/Internet and automation technology environment are available for this purpose. Therefore, the relationship between model, description language and tool is explained in principle and deepened for the realisation of control and regulation designs.
Type of Examination:	Oral examination

Media:	
Literature:	

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Module Name:	Bachelorarbeit
Engl. module name:	Bachelor Thesis
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 7th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	University lecturer at FIN
Lecturer(s):	-
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching Method / SWS:	Colloquium; Bachelor thesis
Workload:	10 weeks or 20 weeks if created in an integrated practice period Independent preparation of a scient. thesis + colloquium
Credit points/ECTS:	12
Prerequisites according to examination regulations:	Successful completion of the module requires proof of 180 CP from the core, compulsory and compulsory elective areas as well as 18 CP from practical experience.
Recommended prerequisites:	
Intended learning outcomes:	Proof should be provided that a problem from a specialised field of computer science can be worked on under supervision using scientific methods within a specified period of time. On successful completion of the module, students are also able to present and defend their own solutions to problems in a structured manner.
Contents:	The topic of the Bachelor's thesis can be derived from current research projects at the institutes or from operational problems of a scientific nature. The assignment is always issued by a university lecturer from the faculties involved in the degree programme. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialised discussion. In the colloquium, the topic of the Bachelor's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.
Type of Examination:	Passed colloquium
Media:	

Literature:	

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Module Name:	Bachelorarbeit (dual)
Engl. module name:	Bachelor Thesis (dual)
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 7th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	University lecturer at FIN
Lecturer(s):	University lecturer at FIN
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching Method / SWS:	Bachelor thesis, colloquium
Workload:	20 weeks Independent preparation of a scient. thesis + colloquium
Credit points/ECTS:	12
Prerequisites according to examination regulations:	Successful completion of the module requires proof of 180 CP from the core, compulsory and compulsory elective areas as well as 18 CP from practical phases
Recommended prerequisites:	
Intended learning outcomes:	Proof should be provided that a problem from a specialist area of computer science can be worked on under supervision using scientific methods within a specified period of time. On successful completion of the module, students are also able to present and defend their own solutions to problems in a structured manner.
Contents:	The topic of the Bachelor's thesis should be derived from operational problems of the practice partner of the dual study programme with a scientific character. The assignment is always issued by a university lecturer from the faculties involved in the degree programme. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialised discussion. In the colloquium, the topic of the Bachelor's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.
Type of Examination:	Passed colloquium
Media:	

Literature:	

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Module Name:	Bachelor-Projekt
Engl. module name:	Bachelor Project
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 7th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	All FIN lecturers
Lecturer(s):	All FIN lecturers
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INF - Study profile - Web founder FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching Method / SWS:	Project
Workload:	Project-specific
Credit points/ECTS:	18
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Transfer of subject-specific knowledge into practiceAssessment of a practical problem and planning of a solution Development of a suitable solution for a typical practical problem Communication with a client about order content, work progress and results Planning and realisation of a longer-term project
Contents:	Students work on a problem formulated by an external client that is related to their field of study. The subject-related services to be provided and the project organisation are agreed with the client. The project organisation includes a milestone plan and a communication plan for the work progress and the results achieved.
Type of Examination:	Ungraded performance on the basis of a project report
Media:	Not applicable
Literature:	Project-specific

Module Name:	Betriebliches Rechnungswesen
Engl. module name:	Betriebliches Rechnungswesen
Abbreviation:	

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Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Business Administration and Economics: https://fww.ovgu.de/Studium/W%C3%84HREND+DES+STUDIUMS/ Studienorganisation+_+Dokumente/Modulhandb%C3%BCcher.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Corporate Accounting, Professorship for Business Taxation
Lecturer(s):	Professorship for Corporate Accounting, Professorship for Business Taxation
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	Written exam (60 minutes)
Media:	
Literature:	

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Module Name:	Biochemie
Engl. module name:	Biochemie
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	FNW, Prof. W. Marwan
Lecturer(s):	FNW, Prof. W. Marwan
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching Method / SWS:	Lecture; practical course
Workload:	Attendance times: 2 SWS lecture / 2 SWS practical courseIndependent work: Reviewing the lecture Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28 h attendance time + 62 h independent work) Internship: 2 CP = 60 h (28 h attendance time + 32 h independent work)
Credit points/ECTS:	Lecture: 3 Internship: 2
Prerequisites according to examination regulations:	Passing the biochemistry exam is a prerequisite for participation in the practical course
Recommended prerequisites:	
Intended learning outcomes:	Students acquire basic skills in biochemistry, focussing on the interactions between molecules, their structure and biochemical principles, so that combinatorial thinking is trained. The practical course serves to apply the theoretical knowledge acquired and to acquire skills in special biochemical working techniques.
Contents:	From chemistry to biochemistry: molecules and principlesProteins: Structure and function Enzymes and enzymatic catalysis Structural and motor proteins Central pathways of catabolic and anabolic metabolism Respiration and photosynthesis Membrane proteins and receptors Principles of bioenergetics and membrane biochemistry
Type of Examination:	Lecture: Written exam 2h. Internship certificate

Media:	
Literature:	Will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module Name:	Biologische Psychologie
Engl. module name:	Biologische Psychologie
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	Biologische Psychologie 1 und 2
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	2 semesters
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Biological Psychology
Lecturer(s):	Professorship for Biological Psychology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Psychology >>> Parts 1 and 2 can also be accounted for individually (2 SWS = 4 CP)
Teaching Method / SWS:	Lecture
Workload:	Attendance times: 2 SWS in WS, 1 SWS in SoSe Independent work: Individual study time (preparation and follow-up) 138 hours 6*30h (42h attendance time + 138h independent work), grading scale according to examination regulations
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: Students should learn the biological foundations of human behaviour. The course content should enable them to understand both the neuronal causes of general psychological phenomena and the analysis of their disorders in the advanced modules.
Contents:	Lecture 1: Fundamentals and perception systems Heredity, research methods, homeostasis Visual, auditory, gustatory, olfactory and somatosensory systems Shape perception, sound localisation in space Motorised system Attention, awareness Lecture 2: Biology of behaviour and cognition Sleep Learning, memory Language, motivation, emotion Endocrine system, sexuality, ageing Psychopathology, music perception, frontal lobe, experimental design
Type of Examination:	

	The module examination is made up cumulatively of the required coursework. The module examination is made up of the average grade achieved in the two lecture examinations. Coursework: Examination during the course (lecture exam at the end of each semester); two graded course achievements must be presented.
Media:	
Literature:	Birbaumer/Schmidt: Biologische Psychologie, Springer Verlag (ISBN-10 3540254609)

English courtesy translation.
The German version is legally binding

Module Name:	Bürgerliches Recht
Engl. module name:	Bürgerliches Recht
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 2nd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Civil Law, Commercial and Economic Law, Law and Economics
Lecturer(s):	Professorship for Civil Law, Commercial and Economic Law, Law and Economics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Key and methodological competences - WPF Law
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 4 SWS Independent work: 5 x 30h (56 h attendance time + 94 h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: gain a basic understanding of legal thinking Master the basics of civil law.
Contents:	Fundamentals of legal methodologyLegal business theory and conclusion of contracts Substitution General Terms and Conditions Law on the impairment of performance Sales and service contract law Other types of contracts (in particular loans, rent and leasing, contracts and agency) Enrichment law Tort law Possession and acquisition of ownership Property law
Type of Examination:	Written exam (120 minutes)
Media:	

Literature:	Legal texts

English courtesy translation.
The German version is legally binding

Module Name:	Business Informatics Research: perspectives and outcomes
Engl. module name:	Business Informatics Research: perspectives and outcomes
Abbreviation:	BIR:PaO
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship for Information Systems I
Lecturer(s):	Professorship for Information Systems I
Language:	English
Assignment to the curriculum:	FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Seminar
Workload:	Attendance times = 28h.: Independent work = 152 h Term paper and presentation
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basics of scientific writing and scientific research methods
Intended learning outcomes:	In-depth knowledge of selected research topics in business informatics
Contents:	Presentation of research results from the field of business informatics and presentation of the research methods used to achieve these results.
Type of Examination:	Term paper (presentation)
Media:	
Literature:	Announcement at the event

English courtesy translation.
The German version is legally binding

Module Name:	CAx-Grundlagen
Engl. module name:	CAx Fundamentals
Abbreviation:	CAx I
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Mechanical Engineering Informatics
Lecturer(s):	Professorship for Mechanical Engineering Informatics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: B.Sc. INGINF - WPF Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercises Independent work: Follow-up of the lecture, independent exercise work outside the actual exercise dates 150h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Computer Engineering II or equivalent lecture
Intended learning outcomes:	Learning objectives & competences to be acquired: Understanding the need for CAD/CAM applications Design and structure of a CAD/CAM system get to know Master the basic elements of a CAD/CAM system for simple modelling tasks Be able to create relevant production documents
Contents:	Methodical basics of computer supportHardware and software of a CAD/CAM system Basic elements of a CAD/CAM system Geometry modelling and product models Working techniques Drawing creation Expansion options
Type of Examination:	Achievements: CAD exercise test (90 min), Examination: written (120 min)

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The German version is legally binding

Media:	Beamer, overhead, blackboard
Literature:	Vajna, Weber, Bley, Zeman: CAx für Ingenieure, Springer-Verlag 2008

English courtesy translation.
The German version is legally binding

Module Name:	Chemie für STK
Engl. module name:	Chemistry
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. rer. nat. Franziska Scheffler
Lecturer(s):	Prof. Dr. rer. nat. Franziska Scheffler
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Process Engineering
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times Lecture: weekly 2h (2 SWS) Seminar/exercises: fortnightly 2h (1 SWS) Independent work Revision of lectures, solving exercises and exam preparation130h (42h attendance time + 88h independent work)
Credit points/ECTS:	4
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Students should be able to quickly recognise the often complex and abstract relationships in chemistry based on fundamental laws and be able to classify their function and benefits for process engineering processes and systems.
Contents:	1. structure of matter: atoms, orbital bonds, forces 2. introduction to the thermodynamics of chemical reactions: Equilibrium, Catalysis, synthesis, redox processes 3. hydrogen, noble gases, halogens, chalcogens and oxygen: Properties, occurrence, presentation, compounds 4. important elements and syntheses: Ammonia, nitrogen oxides, nitric acid, Carbide, carbon monoxide, carbon dioxide, silicon 5. organic compounds: Systematics, nomenclature, bonds, Reaction behaviour and mechanisms, nucleophilic and electrophilic Substitution, elimination 6. oxygen compounds: Alkanols, ethers, phenols, carboxylic acids and Derivatives 7. introduction to stereochemistry: specificity and selectivity, plastics, important solvents, selected large-scale processes
Type of Examination:	Exercise certificate, written exam

English courtesy translation.
The German version is legally binding

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Clean Code Development
Engl. module name:	Clean Code Development
Abbreviation:	CCD
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IKS
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 124h independent work on the internship project
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Software Engineering
Intended learning outcomes:	Principles of clean code development Use of various tools and practices Practical experience in the use of professional methods in software engineering
Contents:	Software engineering deals with the production and development of software, the organisation and modelling of the associated data structures and the operation of software systems. It therefore covers the areas of

	software design, implementation and management. The basic lecture Software Engineering I lays the foundations for good software design and writing. This advanced lecture introduces modern techniques and methods that are frequently used in the development of large software systems. We are guided by the four central values of "clean code development" - evolvability, correctness, production efficiency and traceability. To achieve these goals, a number of different programming principles and practices are introduced. These include, among others Team building and organisation in software development Principles and tools of clean code development Continuous integration and automated build systems Bug tracking, error localisation and debugging Automated and model-based testing Code analysis and quality measures Requirements engineering and tracing Distributed and component-based software architectures The course will offer a high degree of practical handling of tools and instruments, especially in its exercise sections. The aim is to impart not only abstract knowledge, but also very practical skills. The exercises are compulsory and are carried out in groups.
Type of Examination:	Examination: scientific project
Media:	
Literature:	

Module Name:	Cloud School
Engl. module name:	Cloud School
Abbreviation:	CS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship for Information Systems I
Lecturer(s):	Professorship for Information Systems I
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Preparation and follow-up of lectureDevelopment of solutions for the exercise and consolidation of contentSemester assignmentExam preparation 150 h = 45h attendance time + 105h independent work
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Understanding of the cloud computing paradigm, including characteristics, service and deployment models, workloads and revenue models Understanding of the structure of cloud applications Understanding of the support of cloud principles at the business and application layer and the selection of suitable cloud infrastructure and platform offerings Practical application of cloud design patterns for the development and use of cloud applications for various application scenarios (e.g. machine learning, data science)
Contents:	Cloud Computing Fundamentals Cloud Offering Patterns Cloud Application Architecture Patterns Cloud Application Management Patterns Composite Application Pattern Impact of Cloud Computing Properties

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The German version is legally binding

	Cloud Computing Application Scenarios
Type of Examination:	Written exam (admission requirement: successful completion of the semester assignment)
Media:	
Literature:	Fehling, C.; Leymann, F.; Retter, R.; Schupeck, W.; Arbitter, P. (2014): Cloud Computing Patterns: Fundamentals to Design, Build, and Manage Cloud Applications (ISBN: 978-3-7091-1567-1), DOI: 10.1007/978-3-7091-1568-8

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The German version is legally binding

Module Name:	Compilerbau
Engl. module name:	Compiler Construction
Abbreviation:	CB
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance: 2 SWS lecture + 2 SWS exercise (56h) Independent work: Working on the exercises, preparing and following up the lecture, preparing for the exam (94h)
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Practical knowledge of a system programming language such as C or C++ Basic knowledge of data structures and computer architectures
Intended learning outcomes:	Participants learn how compilers work and which basic concepts are used. The knowledge imparted is put into practice in the exercises.
Contents:	Compilers translate programmes from a source language into a target language, usually from a higher programming language into a machine language. Among other things, this allows the same application to be translated for and executed on different processor architectures with relatively little effort. A deeper understanding of compilers helps to write more efficient and secure programmes. The programmes to be translated are also checked and improved by compilers. How many errors can be found depends on the strictness of the language. Some languages, such as Rust, make it more difficult to write programmes without errors, but offer certain guarantees of correctness. In addition, compilers carry out a large number of optimisations in order to use the given computer architecture as efficiently as possible.

	The concepts are taught in the lecture and the exercises are used for the practical application and realisation of the acquired knowledge.
Type of Examination:	Examination prerequisites will be announced at the beginning of the course. Oral examination
Media:	
Literature:	Introduction to Compilers and Language Design (Douglas Thain)

English courtesy translation.
The German version is legally binding

Module Name:	Computational Fluid Dynamics
Engl. module name:	Computational Fluid Dynamics
Abbreviation:	CFD
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professor for Fluid Dynamics
Lecturer(s):	Dr.-Ing. G. Janiga
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Presence: Weekly lecture 1 SWS Weekly exercises 2 SWS (with computer hands-on) Autonomous work: Complementary reading, final project work 90h (42 h presence + 48 h autonomous work)
Credit points/ECTS:	3
Prerequisites according to examination regulations:	Fluid Dynamics
Recommended prerequisites:	Advanced Fluid Dynamics
Intended learning outcomes:	Students participating in this course will get both a solid theoretical knowledge of Computational Fluid Dynamics (CFD) as well as a practical experience of problem-solving on the computer.Best-practice guidelines for CFD are discussed extensively. CFD-code properties and structure are described and the students first realize their own, simple CFD-code, before considering different existing codes with advantages and drawbacks. At the end of the module, the students are able to use CFD in an autonomous manner for solving a realistic test-case, including a critical check of the solutions obtained.
Contents:	Introduction and organisation, main discretization methodsVector- and parallel computing, supercomputers, optimal computing loop. Validation procedure, Best Practice Guidelines. Linear systems of equations and iterative solution methods. Practical solution of unsteady problems, explicit and implicit methods, stability. Gridding and grid independency. Practical CFD, importance and choice of physical models. Properties and computation of turbulent flows. Properties and computation of Non-newtonian flows. Properties and computation of multi-phase flows.

	Preparation of final CFD project as teamwork
Type of Examination:	Success: Oral defence of final CFD project Exam: oral
Media:	
Literature:	Ferziger and Peric, "Computational Methods for Fluid Dynamics", Springer (2002) Further literature given during first lecture

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The German version is legally binding

Module Name:	Computational Geometry
Engl. module name:	Computational Geometry
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 1 SWS Exercise Independent work: Completion of the exercises and follow-up of the lectures 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Knowledge of the basics of algorithmic geometry
Intended learning outcomes:	Learning objectives & acquired competences: Ability to develop algorithms and data structures for complex geometric problems. Ability to analyse and assess
Contents:	Design principles for geometric algorithms (algorithm design paradigms), classical topics of algorithmic geometry such as arrangements, visibility, simplification and reconstruction problems, geometric optimisation problems, higher data structures.
Type of Examination:	Examination prerequisite: see lecture Exam: oral
Media:	

Literature:	de Berg, Cheong, van Kreveld, Overmars,; Computational Geometry (3. Edition). Boissonnat, Yvinec; Algorithmic Geometrie.

English courtesy translation.
The German version is legally binding

Module Name:	Computer Aided Geometric Design
Engl. module name:	Computer Aided Geometric Design
Abbreviation:	CAGD
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Applied Computer Science / Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS lecture / 1 SWS exercise Independent work: Reviewing the lecture Solving the exercises 150 h (56 h attendance time + 94 h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Computer Graphics I, Mathematics I to III
Intended learning outcomes:	Learning objectives & acquired competences: Learn the most important techniques for curve and surface modelling Understanding the underlying theoretical principles Application of the approaches to other problems in computer science (data interpolation, data approximation, data extrapolation, numerical methods)
Contents:	Differential geometry of curves and surface Bezier curves Bezier spline curves B-spline curves Rational curves Polar moulds Tensor product Bezier and B-spline surfaces Bezier surfaces over triangles Surface interrogation and fairing Subdivision curves and surfaces

English courtesy translation.
The German version is legally binding

Type of Examination:	Admission prerequisite: successful completion of the exercises Oral examination Certificate: Passing the oral examination
Media:	
Literature:	G. Farin. Curves and Surfaces for Computer Aided Geometric Design. Morgan Kaufmann, 2002. Fourth edition.G. Farin and D. Hansford. The Essentials of CAGD. AK Peters, 2000. J. Hoschek and D. Lasser. Grundlagen der Geometrischen Datenverarbeitung. B.G. Teubner, Stuttgart, 1989. (English translation: Fundamentals of Computer Aided Geometric Design, AK Peters.) G. Farin. NURB Curves and Surfaces. AK Peters, Wellesley, 1995.

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The German version is legally binding

Module Name:	Computer-Assisted Surgery
Engl. module name:	Computer-Assisted Surgery
Abbreviation:	CAS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 1st semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Chair for Virtual and Augmented Reality Group
Lecturer(s):	Christian Hansen
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Seminar; Project
Workload:	Lecture + Seminar (4SWS) or Lecture + Teamproject (4SWS) for Bachelor students: 150h (56h contact hours + 94h self-study) for Master students: 180h (56h contact ours + 124h self-study)
Credit points/ECTS:	Bachelor: 5 Master: 6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The following topics are addressed: Fundamentals of Intraoperative Imaging Fundamentals of Surgical Visualisation Computer-Assisted Surgery Planning Surgical Navigation Systems Surgical Augmented Reality Surgeon-Computer Interaction Robotic Surgery Development and Evaluation of Medical Software
Contents:	

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The German version is legally binding

	Computer-assisted surgery is an interdisciplinary research field that builds a bridge between surgery and computer science. It represents a set of methods which use computer technology to support preoperative planning, the actual surgery, and postoperative assessment. This module will offer an overview of computer-assisted surgery. After an introduction of fundamentals, the state of the art in computer-assisted surgery is presented on the basis of clinical examples.
Type of Examination:	Participation and active involvement in the course and the exercises, successful realisation of the exercises and final examination Exam: oral
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Computergestützte Diagnose und Therapie
Engl. module name:	Computer Aided Diagnosis and Therapy
Abbreviation:	CDT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Applied Computer Science / Visualisation
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application Subject - Medical Technology
Teaching Method / SWS:	Lecture; Seminar
Workload:	Attendance times: 2 SWS lecture, 2 SWS seminar Independent work: Follow-up of the lecture material, preparation of lectures, exam preparation 180h = 4 SWS = 56h attendance time + 124h self. Work incl. term paper
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Lecture Visualisation
Intended learning outcomes:	Understanding of selected diagnostic and therapeutic processesAbility to assess the need for computer supportUnderstanding of the criteria for the acceptance of (new) software solutions in image-based diagnostics and therapy
Contents:	Principles of 3D imaging in medicineDescription of selected diagnostic processes Quantification in image-based diagnostics Computer-aided diagnostics, in particular detection of round lung centres in CT data and lesions in mammograms Basics and applications of virtual endoscopy Basics and selected examples of planning interventions and operations Computer-aided planning and evaluation of operational strategies Integration of simulation and visualisation in therapy planning Consideration of case studies: Diagnostics of vascular diseases, planning and intraoperative support of neurosurgical interventions, planning of cervical lymph node evacuations, planning of liver surgery interventions
Type of Examination:	Examination prerequisite: see lecture Exam: oral

Media:	
Literature:	Lehmann, Thomas "Digitale Bildverarbeitung für Routineanwendungen", Universitätsverlag, 2005Preim, Bartz "Visualisation in Medicine", Morgan Kaufman, 2007 Preim, Botha: Visual Computing for Medicine, 2nd Edition, , Morgan Kaufman, San Francisco, 2013

Module Name:	Computernetze 1
Engl. module name:	Computer Networks 1
Abbreviation:	ComNets1
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Computer Engineering / Communication and Net-worked Systems
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	2 SWS Lecture (Bachelor + Master) 2 SWS Exercise (Bachelor) Bachelor: Independent work = 94 h + 56 h attendance Processing of exercises and programming tasks & exam preparation Master: Independent work = 122 h + 28 h attendance
Credit points/ECTS:	Bachelor, Master: 5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Computer Engineering ITC Computer Engineering II Programming paradigms Algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired competences: Comprehensive understanding of the basics of computer networks Ability to understand and categorise the basic layer architecture and apply the main protocols of the Internet Competence to analyse the basic security aspects and implement them accordingly in communication services

	For Master's students: advanced competences in scientific research and writing
Contents:	Contents Basic protocols and approaches from the physical layer to the application layer ISO/OSI architecture vs TCP/IP architecture Data transmission Media access control Error handling Reliable message transmission Communication security Basic services at application level
Type of Examination:	Services: Regular participation in lectures and exercises Successful completion of a programming task Exam: Written exam 120 min
Media:	
Literature:	A detailed literature list will be announced in the lecture. Basic literature: Andrew S. Tanenbaum, “Computer Networks”, Pearson International James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach”, Addison Wesley

English courtesy translation.
The German version is legally binding

Module Name:	Data Management for Engineering Applications
Engl. module name:	Data Management for Engineering Applications
Abbreviation:	DMEA
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Computer Systems
Lecturer(s):	Dr. Eike Schallehn
Language:	English
Assignment to the curriculum:	FIN: B.Sc. INGINF - WPF Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DKE (old) - Applications area
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercises & exam preparation Bachelor: 5 credit points = 150h = 4SWS = 56h attendance time + 94h independent work Master: 6 credit points = 180h = 4 SWS = 56h attendance time + 94h independent work + 30h task (laboratory exercise)
Credit points/ECTS:	Bachelor: 5 Master: 6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Identifying, describing and classifying engineering applications, basic understanding of information systems, ability to design a database in the context of an engineering application
Contents:	Introduction to the design of relational database systems, product data management with database systems, workflow support and interoperability, data management in automation
Type of Examination:	Examination prerequisite: Registration and participation in the lecture and exercise Examination or certificate: written 120min
Media:	

Literature:	See http://wwwiti.cs.uni-magdeburg.de/iti_db/lehre/

English courtesy translation.
The German version is legally binding

Module Name:	Data Mining – Einführung in Data Mining
Engl. module name:	Data Mining
Abbreviation:	DM4BA
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: Lecture and exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 150h=56h attendance time+94h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basics of computer science, databases, programming
Intended learning outcomes:	Learning objectives & acquired competences: Acquisition of basic knowledge of data mining Application of data mining skills to solve real-world, simplified problems Familiarity with data mining tools
Contents:	Data and data preparation for data miningData mining methods for: Classification, clustering, discovery of association rules Data mining tools and software suites Case studies
Type of Examination:	Preliminary work:Successful completion of the exercises, Presentation of results Modalities will be announced at the beginning of the event. Exam: written (in German)

English courtesy translation.
The German version is legally binding

Media:	
Literature:	Pan-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar. Introduction to Data Mining, PEARSON, 2019 (2nd edition) Salvador Garcia, Julian Luengo, Francisco Herrera Data Preprocessing in Data Mining, SPRINGER International Publishing Switzerland, 2015 Die Literaturliste kann zusätzliche Fallstudien und weitere wissenschaftliche Arbeiten umfassen. Diese werden am Anfang des jeweiligen Veranstaltungsblocks bekannt gegeben.

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The German version is legally binding

Module Name:	Data Mining II - Advanced Topics in Data Mining
Engl. module name:	Data Mining II - Advanced Topics in Data Mining
Abbreviation:	DM2
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science WPF for Master Statistics (Export)
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: Lecture and exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 6 CP = 56h attendance time (4 SWS) + 124h independent work
Credit points/ECTS:	6 Export: The number of CP is determined in the study documents of the respective importing degree programme.
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basics of: Data Mining
Intended learning outcomes:	Learning objectives & acquired competences: This module teaches how high-dimensional, complex, dynamic data can be analysed using mining methods. The module provides knowledge of methods and skills for analysing and evaluating data, i.e. for using the methods in selected application scenarios.
Contents:	- Stream mining: basics, methods and evaluation approaches - Time series: basics, prediction methods and evaluation approaches and application examples
Type of Examination:	Preliminary work:Successful completion of the exercisesPresentation of results

	Modalities will be announced at the beginning of the event. Exam: written
Media:	
Literature:	Scientific articles (information at the beginning of the semester) The bibliography may include additional case studies and other academic papers. These will be announced at the beginning of each course block.

English courtesy translation.
The German version is legally binding

Module Name:	Data Warehouse-Technologien
Engl. module name:	Introduction to Data Warehousing
Abbreviation:	DWT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Computer Systems
Lecturer(s):	Dr. David Broneske
Language:	english
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Course "Databases I" and "Databases II"
Intended learning outcomes:	Learning objectives & acquired competences: Understanding the data warehouse approach Understanding of database technologies in the environment of data warehouses Ability to use DW-specific DBMS functionality Ability to design and develop a data warehouse application
Contents:	The data warehouse approach, delimitationArchitecture Extract-Transform-Load OLAP and the multidimensional data model Realisation in databases Enquiry processing and optimisation Index and storage structures Business Intelligence

Type of Examination:	Prerequisite for admission to the examination: Registration and participation in the exercises Exam: written
Media:	
Literature:	Data Warehouse Technologies. Veit Köppen, Gunter Saake Kai-Uwe Sattler. 2nd edition, mitp-Verlag, 2014

English courtesy translation.
The German version is legally binding

Module Name:	Datenanalyse, Visualisierung und Visual Analytics
Engl. module name:	Data Analysis, Visualisation and Visual Analytics
Abbreviation:	DataVisVA
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship Visual Computing
Lecturer(s):	Dr. Dirk Joachim Lehmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture
Workload:	Attendance times: 2 SWS weekly lecture Independent work: Reviewing the lecture Exam preparation Writing an extensive term paper 150 h (28h attendance time + 42h independent follow-up work + 60h term paper + 20h exam preparation)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Fundamentals of statistics, image processing and visualisation
Intended learning outcomes:	Learning objectives & competences to be acquired: Methods of classical data analysis Methods of interactive visual data analysis Opportunities and limitations of combining both approaches (visual analytics) Visual analytics methods Understanding of application areas of visual analytics Ability to independently select suitable techniques - whether visual, interactive or automated - to solve a data analysis problem. (solution-orientation) Ability to recognise when a data analysis problem cannot be addressed with existing techniques. (Effectiveness & problem awareness) Ability to independently develop further analysis techniques from the literature. (Independence)
Contents:	Biological and cognitive foundationsData models and their formal description

	Overview of classic (automatable) data analysis topics Visual search vs. automatic data analysis: comparison of the respective advantages and disadvantages and complementary features Spectrum of interactive visualisation techniques and visual manipulation techniques of explorative visual data analysis Dimension-reducing techniques (multivariate projections) for the visual search for patterns, quality measures for the automated evaluation of visualisations, interpretation rules for selected visualisations Scaling problem, oversubscription problem, subspace clustering Visual design = methods for selecting suitable visualisation approaches depending on the domain and data type of the underlying data Visual analytics, as a combination of automatic data analysis (pre-process, e.g. for data reduction) and interactive multiple visualisation techniques Current tools, realisations and evaluations for visual analytics in practical application, open problems
Type of Examination:	Prerequisite: Participation in lecture, passed term paper Exam: written exam (written test) Certificate: Passing the exam
Media:	Powerpoint, blackboard, video, software demonstrations
Literature:	Literature references during the lecture.

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The German version is legally binding

Module Name:	Datenbanken
Engl. module name:	Databases
Abbreviation:	100391
Notes:	
Subtitles (if applicable):	DB I
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 1st semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Gutner Saake
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Core subjects FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Apply FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times = 56h: 2 SWS lecture, 2 SWS exercise Independent work = 94h: Exercises & exam preparation Master: + 30h additional task
Credit points/ECTS:	Bachelor: 5 Master: 6
Prerequisites according to examination regulations:	Cannot be taken together with "Database Concepts"
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Basic understanding of database systems (terms, basic concepts) Ability to design a relational database Knowledge of relational database languages Ability to develop database applications
Contents:	Properties of database systemsArchitectures Conceptual design of a relational database Relational database model Mapping ER schema to relations Database languages (relational algebra, SQL) Formal design criteria and normalisation theory Application programming Other database concepts such as views, triggers, assignment of rights
Type of Examination:	

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	Examination prerequisite: completion of the exercises, preliminary examination results will be announced at the beginning of the semester Examination/Certificate: written (120 min)
Media:	
Literature:	Databases - Concepts and Languages. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer. March 2013, ISBN 3-8266-9453-8, Mitp-Verlag; Edition: 5th, updated and expanded ed.

English courtesy translation.
The German version is legally binding

Module Name:	Deutsch als Fremdsprache A2 BiBa
Engl. module name:	German as a Foreign Language A2 BiBa
Abbreviation:	DaF-A2 BiBa
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Claudia Krull
Lecturer(s):	Language Centre
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF English track - Language section
Teaching Method / SWS:	Seminar
Workload:	8 SWS 4 SWS during the semester, 4 SWS in 3 weeks as an intensive course during the lecture-free period
Credit points/ECTS:	8 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Proven language level A1
Intended learning outcomes:	German level A2 according to CEFR
Contents:	
Type of Examination:	Exam at language level A2
Media:	
Literature:	

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Module Name:	Deutsch als Fremdsprache B2 BiBa
Engl. module name:	German as a Foreign Language B2 BiBa
Abbreviation:	DaF-B2 BiBa
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	2 semesters
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Claudia Krull
Lecturer(s):	Language Centre
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF English track - Language section
Teaching Method / SWS:	Seminar
Workload:	8 SWS 2 x 4 SWS over 2 semesters
Credit points/ECTS:	8 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	passed language level B1
Intended learning outcomes:	German level B2 according to CEFR
Contents:	
Type of Examination:	Exam at language level B2
Media:	
Literature:	

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The German version is legally binding

Module Name:	Digital Engineering Project
Engl. module name:	Digital Engineering Project
Abbreviation:	DE project
Notes:	
Subtitles (if applicable):	Digital Engineering Project
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 3rd/4th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	supply-specific
Lecturer(s):	supply-specific
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Digital Engineering Project
Teaching Method / SWS:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 360h = 12 weeks of 30 hours each
Credit points/ECTS:	12
Prerequisites according to examination regulations:	
Recommended prerequisites:	supply-specific
Intended learning outcomes:	The digital engineering project gives students a realistic introduction to the challenges of interdisciplinary project work. In this project, students work together in teams (usually 2-5 people) on an innovative, interdisciplinary task. The aim is for students to gain practical experience in project work that is based on the division of labour and spans competencies and disciplines. Digital Engineering projects are therefore often organised across faculties and/or in cooperation with institutes of applied research. In addition to specialisation, students are introduced to scientific work, e.g. by working on scientific publications or participating in scientific events. The digital engineering project can be divided into two sub-projects upon justified request.
Contents:	This module is implemented by different university lecturers. The subject content is therefore specific to the programme.
Type of Examination:	supply-specific
Media:	
Literature:	

Module Name:	Digital Information Processing
Engl. module name:	Digital Information Processing
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. A. Wendemuth, FEIT-IESK
Lecturer(s):	Prof. Dr. A. Wendemuth, FEIT-IESK
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching Method / SWS:	Lecture; Exercise
Workload:	Time of attendance 2 hours/week - lecture 1 hours/week - exercises Autonomous work: post processing of lectures preparation of exercises and exam 120 h (42 h time of attendance and 78 h autonomous work)
Credit points/ECTS:	4
Prerequisites according to examination regulations:	Bachelor in Electrical Engineering or related studies Knowledge of signals and systems, Analogue Fourier transformations
Recommended prerequisites:	
Intended learning outcomes:	The participant has an overview of basic problems and methods of digital signal processing.The participant understands the functionality of a digital signal processing system and can mathematically explain the modus of operation. The participant can assess applications in terms of stability and other markers. He / She can calculate the frequency response and reconstruction of analogue signals. The participant can perform these calculations and assessments as well on stochastically excited digital systems. The participant can apply this knowledge in a field of specialisation, e.g. Medical Signal Analysis
Contents:	Digital Signals and Digital LTI SystemsZ-Transform and Difference Equations Sampling and Reconstruction Synthesis and analysis of such systems Discrete and Fast Fourier Transforms Processing of Stochastic Signals by LTI-Systems: Correlation Techniques and Model-Based Systems (ARMA) Selected Specialisation Topics, e.g. Medical Signal Analysis

Type of Examination:	Mandatory participation in exercise classes, successful results in exercises / written exam at the end of the course
Media:	
Literature:	Wendemuth, A (2004): "Grundlagen der Digitalen Signalverarbeitung", 268 pages, Springer Verlag, Heidelberg. ISBN: 3-540-21885-8 Oppenheim, A; Schafer R (1975): "Digital Signal Processing" 784 pages, Prentice Hall, ISBN: 0132146355

Module Name:	Digitale Medien im Unterricht (Medienpraxis)
Engl. module name:	Digitale Medien im Unterricht (Medienpraxis)
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Dr. Henry Herper
Lecturer(s):	Dr. Henry Herper
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Educational Science FIN: M.Sc. CV - Area Applications / Humanities Basics
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 1 SWS exercise 1 SWS Internship Independent work: Follow-up of the lecture and exercise, solving the exercises Creating a teaching project for notebook classes using classroom controls and interactive whiteboards Exam preparation Bachelor: 5 credit points = 150 hours (56 hours of attendance time in lectures and exercises + 94 hours of independent work) Master: 6 credit points = 180 hours (56 hours of attendance time in lectures and tutorials + 124 hours of independent work) through additional work (term paper)
Credit points/ECTS:	Bachelor: 5 Master: 6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The students know the basics of visualisation and perception can independently prepare and manage digital teaching materials can create digital blackboard images using multimedia components in the classroom are able to use digital measuring and recording systems in conjunction with interactive displays know methods for teaching with notebook classes with interactive displays and using didactic classroom controls know the technical basics of the systems used are able to develop digital teaching material

English courtesy translation.
The German version is legally binding

Contents:	Basics of visualisation and perceptionUse of interactive whiteboards in the classroom Integration of multimedia components into the board design Digital experimentation in science lessons Teaching methods for interactive whiteboards, classroom controls and notebook classes Learning status surveys in notebook classes Developing subject-specific teaching projects Legal foundations and social effects of media use
Type of Examination:	Examination: oral examination by project presentation
Media:	
Literature:	see http://lehramt.cs.uni-magdeburg.de/Skripte/Didaktik/index.html

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The German version is legally binding

Module Name:	Digitalhandwerk
Engl. module name:	Digital craft
Abbreviation:	DHW
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems The course can also be recognised as a "Scientific Team Project" or "Scientific Team Project - Management Information Systems".
Teaching Method / SWS:	Exercise; Seminar
Workload:	Bachelor: Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise + Independent work = 94 h Master: Attendance times = 56 h 2 SWS Seminar + Independent work = 124 h
Credit points/ECTS:	Bachelor: 5 CP Master: 6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The aims of the course are: -Reflection on the personal approach to computer science

	-Merging concrete art and computer science with the ideas of the Bauhaus pre-courses: -- Materialise the immaterial -- Computer science you can touch -Development of an independent idea for a preliminary course for computer science Learn how to create three-dimensional models
Contents:	As part of this course, students will gain an artistic and creative insight into computer science. To this end, they will deal with the following topics, among others: -3D printing and 3D scanning -Concrete Art Pre-courses of the Bauhaus -Design theory -Colour theory and artistic design -Digitisation
Type of Examination:	The examination is a term paper written in a group. Further details will be announced in the lecture at the beginning of the semester. A preliminary examination is not required. FIN: B.Sc. WIF - WPF Verstehen & Gestalten: only graded creditable.
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Distributed Data Management
Engl. module name:	Distributed Data Management
Abbreviation:	DDM
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Dr. Eike Schallehn
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	180h (56 h contact hours + 124 h self-study) Lectures (2 SWS) and exercises (2 SWS)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Database introduction course
Intended learning outcomes:	Comprehension of basic principles and advantages of distributed data managementCompetence to develop distributed databases Comprehension of query and transaction processing in distributed and parallel databases Competence to optimise the run-time performance and sat-isfy requirements regarding reliability and availability of distributed systems
Contents:	Overview and classification of distributed data management (distributed DBMS, parallel DBMS, fedrated DBMS, P2P)Distributed DBMS: architecture, distribution design, distributed query processing and optimisation, distributed transactions, and transactional replication Parallel DBMS: fundamentals of parallel processing, types of parallelisation in DBMS, parallel query processing
Type of Examination:	Exam requirements: Participation and active involvement in the course and the exercises Examination: written (120 minutes)

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Effiziente Programmierung und Ein-/Ausgabe
Engl. module name:	Efficient Programming and Input/Output
Abbreviation:	EPEA
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - Scientific seminar FIN: B.Sc. CV - Key and methodological competences - Scientific seminar FIN: B.Sc. INF - Key and methodological competences - Scientific seminar FIN: B.Sc. INGINF - Key and methodological competences - Scientific seminar FIN: B.Sc. WIF - Key and methodological competences - Scientific seminar
Teaching Method / SWS:	Seminar
Workload:	Attendance: 2 SWS Seminar (28h) Independent work: Working on and presenting the chosen topic, following up the presentations, preparing the written paper (122h)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basic programming skills Knowledge of the basic mechanisms of operating systems (e.g. computer engineering) Basic knowledge of computer architectures as well as algorithms and data structures
Intended learning outcomes:	Participants learn to work independently on a given topic and present it to the other participants in an understandable way.
Contents:	Optimising the use of modern computer architectures is no easy task, which is why scientists are constantly faced with new challenges when developing efficient applications. Input/output in particular is often a bottleneck. An in-depth understanding of the hardware and software environment and possible causes of performance problems is therefore essential for efficient programming. The seminar is about efficient programming and input/output in the broader sense. This includes the actual development of efficient applications as well as debugging and analysing their performance. Information on various topics will be researched and presented using concrete examples. For example, compiler optimisations, tools for debugging and performance analysis, approaches to data reduction and scientific publications on current research issues can be presented.

Type of Examination:	Report, Written elaboration
Media:	
Literature:	

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The German version is legally binding

Module Name:	Einführung in die Betriebswirtschaftslehre
Engl. module name:	Einführung in die Betriebswirtschaftslehre
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Business Administration and Economics: https://fww.ovgu.de/Studium/W%C3%84HREND+DES+STUDIUMS/Studienorganisation+_+Dokumente/Modulhandb%C3%BCcher.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Entrepreneurship, Professorship for International Management
Lecturer(s):	Professorship for Entrepreneurship, Professorship for International Management
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

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The German version is legally binding

Module Name:	Einführung in die Informatik
Engl. module name:	Introduction to Computer Science
Abbreviation:	Einf. INF
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	FIN professors
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Core subjects FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Design
Teaching Method / SWS:	Lecture; Exercise; Tutorial
Workload:	Attendance times: 4 SWS Lecture 2 SWS Exercise 1 SWS Tutorial Independent work: Solving the exercises including tutorials and exam preparation 300 h = 7 SWS = 98 h attendance time + 202 h independent work
Credit points/ECTS:	10
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: - Acquisition of basic knowledge of the concepts of computer science - Ability to solve algorithmic tasks and to design data structures - Familiarity with the computerised way of thinking when solving problems
Contents:	- Basic concepts in Java - Functions - Object-orientated programming - Programming paradigms - Selected algorithms: Searching and sorting - Analysing algorithms: Correctness and complexity - Basic data structures and abstract data types - Predictability and decisiveness
Type of Examination:	Exam: Written exam 120 min. Admission prerequisites: successful completion of the exercises (voting)

English courtesy translation.
The German version is legally binding

Media:	
Literature:	Saake/Sattler: Algorithmen und DatenstrukturenGoodrich/Tamassia: Data Structures and Algorithms in Java Sedgewick: Algorithms

English courtesy translation.
The German version is legally binding

Module Name:	Einführung in die Verfahrenstechnik
Engl. module name:	Einführung in die Verfahrenstechnik
Abbreviation:	EinfVT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Hanke-Rauschenbach, Max Planck Institute; Jun. Prof. Metzger, Institute of Process Engineering
Lecturer(s):	Dr. Hanke-Rauschenbach, Junior Professor Metzger
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Process Engineering
Teaching Method / SWS:	Lecture
Workload:	1 SWS Lecture
Credit points/ECTS:	-
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Initial knowledge of issues, tools and areas of application in process engineering
Contents:	1 What is process engineering? 2. detergents, surfactants and pharmaceuticals 3. basics of modelling and simulation of process engineering processes - What does a computer scientist have to do with process engineering? 4. paragraph-by-paragraph distillation - from fruit to schnapps "Mixing Impossible" - Monte Carlo simulation with water, oil and soap Solids process engineering models - SolidSim, pore networks, discrete element method "Computer science meets process engineering" ProMoT - object-oriented modelling tool
Type of Examination:	none
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Einführung in die Volkswirtschaftslehre
Engl. module name:	Einführung in die Volkswirtschaftslehre
Abbreviation:	EVWL
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Business Administration and Economics: https://fww.ovgu.de/Studium/W%C3%84HREND+DES+STUDIUMS/Studienorganisation+_+Dokumente/Modulhandb%C3%BCcher.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Economic Policy (VWL3), FWW
Lecturer(s):	Dr. S. Hoffmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Einführung in die Wirtschaftsinformatik
Engl. module name:	Business Informatics (Introduction)
Abbreviation:	EWIF
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Prof. Dr. Klaus Turowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Understanding
Teaching Method / SWS:	Lecture; Exercise
Workload:	150h Attendance times: 28h Lecture 28h Exercise Independent work: Preparation and follow-up of the lecture Development of solutions in the exercise Completion of the preliminary examination work [CH1] Lecture 2 SWS = 28h attendance time + 62h independent work Exercise 2 SWS = 28h attendance time + 32h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Creating a basic understanding of business informatics as a specialised discipline and scienceLearning the basic concepts of business informatics Acquisition of broad knowledge of the various fields of business informatics Acquisition of programming techniques for individual data processing
Contents:	- Definition and categorisation of business informatics - Job profiles for business IT specialists - Business informatics as a science - Basic concepts of business informatics - Introduction to classic IT project management - Requirements management - Modelling of business structures and processes - Development of business problem solutions with end-user tools

Type of Examination:	Preliminary work as specified at the beginning of the semester Written examination, 120 min
Media:	
Literature:	Enzyklopädie der Wirtschaftsinformatik (http://www.enzyklopaedie-der-wirtschaftsinformatik.de/)

English courtesy translation.
The German version is legally binding

Module Name:	Einführung in die Wissensrepräsentation
Engl. module name:	Introduction to knowledge representation
Abbreviation:	KR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 4th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Fabian Neuhaus
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + 2 SWS tutorial Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam (Bachelor) 5 CP = 56h attendance time + 94h independent work (Master) 6 CP = 56h attendance time + 124h independent work
Credit points/ECTS:	5CP (Bachelor), 6 CP (Bachelor)
Prerequisites according to examination regulations:	
Recommended prerequisites:	Successful completion of the "Logic" module or sound knowledge of the topics covered in the "Logic" module.
Intended learning outcomes:	Understanding of the basic concepts and methods of knowledge representationUnderstanding of the logical foundations of the languages relevant for ontologies and knowledge graphsAbility to develop simple knowledge bases yourselfMaster: Additional experience in the application of the methods presented
Contents:	

	In this module, students are introduced to the basics of knowledge representation. This is done using the example of technologies that are used for the representation of knowledge in the form of knowledge graphs and ontologies. The intended learning outcomes include: (a) an understanding of the theoretical foundations of knowledge representation, (b) knowledge of important languages, methods and tools used in practice to represent knowledge and (c) the ability to develop simple knowledge graphs and ontologies themselves. This module covers the following topics: Theoretical foundations of knowledge representation and formal semanticsResource Description Framework (RDF): a language for knowledge graphs Resource Description Framework Schema (RDFS): a language for simple controlled vocabularies and taxonomiesSPARQL Protocol and RDF Query Language: a query language for RDF(S) graphsWeb Ontology Language (OWL): a language for applied ontologiesMethods for developing knowledge graphs and ontologies Examples of knowledge graph and ontology applications in practice
Type of Examination:	Examination prerequisites: will be announced at the beginning of the semester, successful completion of the exercises Examination form: oral
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Einführung in Digitale Spiele
Engl. module name:	Introduction to Digital Games
Abbreviation:	EiDS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Holger Theisel
Lecturer(s):	Junior Prof. Alexander Dockhorn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	150 hours: 2 hours lecture + 2 hours exercise = 56 hours + 94 hours self-study and practical work on a prototype and its presentation
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Students should understand the content design of games from a systematic point of view. They will be familiar with the main work processes in the games industry and their structure. During the course, they will gain a first impression of the technical complexity of a game. They receive an initial overview of the conception and development of computer games and are encouraged to develop their own ideas for games and realise them in the form of a prototype. Students will be familiar with the software architecture of computer games and will be able to make cross-references to other areas of computer science. They learn about the most important components of an engine in the context of its theoretical foundations and its practical use. Mathematical fundamentals are first consolidated and then the functionality of a game engine and its core components are explained. Students should gain a conceptual understanding of the components and apply these during the development of a prototype.
Contents:	Game DesignGame Development Software Patterns2D-3D Math Game ConceptsCameras, Rendering, AnimationsLights, Shadows, ShadersPhysical Engines, CollisionsAudio EnginePathfinding, Steering, NavigationProcedural Content GenerationGame AIPrototyping, Playtesting, Publishing

English courtesy translation.
The German version is legally binding

Type of Examination:	Completion of exercises and their presentation. Creation of a prototype and its presentation
Media:	
Literature:	Gregory, J. (2018). Game Engine Architecture (3rd ed.). CRCShell, J. (2014). The Art of game Design A Book of Lenses. CRCSteve Rabin: "Introduction to Game Development", Charles River Media, 2010Thomas Akenine-Möller, Eric Haines, Naty Hoffman: "Real Time Rendering", Peters, 2008Unity Learn: https://learn.unity.com

English courtesy translation.
The German version is legally binding

Module Name:	Electronic System Level Modelling
Engl. module name:	Electronic System Level Modelling
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.- Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.- Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, fortnightly tutorials 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 3 SWS / 6 credit points = 180 h (42 h attendance time + 138 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science, basic knowledge of C/C++
Intended learning outcomes:	Learning objectives & competences to be acquired: After successfully completing the module, students should be able to independently design complex system descriptions with SystemC. They will be able to select the appropriate modelling style for a given problem and gradually refine models from the transaction level to the register transfer level. Students will be able to explain how the SystemC simulation kernel works, provide a comprehensive overview of the classes available in SystemC and use them appropriately. They will also be able to discuss current problems in system design and common modelling concepts. Through practical exercises, students are able to deepen their knowledge and skills in a research-oriented manner and apply and evaluate them in complex problems.
Contents:	Modelling concepts for complex systemsModelling languages Introduction SystemC Register transfer level modelling with SystemC Simulation algorithm Transcation level modelling with SystemC Modelling of temporal processes High-level synthesis
Type of Examination:	Oral examination

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Elektrische Antriebe I (Elektrische Antriebssysteme I)
Engl. module name:	Electrical drives 1
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Electrical Drives
Lecturer(s):	Prof. Dr.-Ing. habil. Frank Palis
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Electrical Engineering
Teaching Method / SWS:	Lecture; Exercise; Practical course
Workload:	Attendance times: Winter Semester 2 SWS Lecture 1 SWS Exercise Summer term 1 SWS Internship Independent work: Exercise preparation 150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basic knowledge of electrical machines and actuators, power electronics, control and regulation technology
Intended learning outcomes:	Learning objectives and competences to be acquired: Selection of the structure of electric drive systems according to the requirements of the machines and technological processes with the aim of optimising energy use and dimensioning the required assembly Realisation of movement processes in machines and systems in accordance with energy, technological and automation requirements
Contents:	Tasks and structure of an electric drive system, Characteristics of movement processes, Mechanics of the drive system (equation of motion and description of the motion variables), typical resistance-torque characteristics of working machines, starting and braking of a drive system, stable operating point, the mechanical transmission system), steady-state and dynamic behaviour of selected electrical machines (DC shunt-wound machines, asynchronous machines with slip ring and squirrel-cage rotors, synchronous machines), structures of binary-controlled drive

	systems with asynchronous machines for starting, braking and speed control, control structures of speed- and position-controlled electrical drive systems
Type of Examination:	Requirements: Compulsory participation in the exercises, successful completion of the laboratory practical (certificate) Exam: written (90 min)
Media:	
Literature:	U. Riefenstahl: Elektrische Antriebssysteme, B.G.Teubner Verlag Stuttgart, Leipzig 2000, 2006 D. Schröder: Elektrische Antriebe, Bd.1-4, Springer-Verlag, Berlin, Heidelberg, 1994, 2001 W. Leonhard: Control of Electrical Drives. Springer-Verlag, Berlin, Heidelberg, New York,1996

English courtesy translation.
The German version is legally binding

Module Name:	English TopUp BiBa
Engl. module name:	English TopUp BiBa
Abbreviation:	Engl-TopUp
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	4 semesters
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Claudia Krull
Lecturer(s):	Language Centre
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF German Track - Language FIN: B.Sc. BiBaINF English track - Language section
Teaching Method / SWS:	Seminar
Workload:	8 SWS spread over 4 semesters, 2 SWS per semester
Credit points/ECTS:	8-10 CP (depending on whether extra services are provided)
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	English language refresher starting from B2 Abitur level with a focus on academic soft skills and technical language
Contents:	communicaCommunication Cultural Studies, Media Literacy Critical Thinking Presentation Skills
Type of Examination:	partially graded
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Entwurf, Organisation und Durchführung eines Programmierwettbewerbs
Engl. module name:	Entwurf, Organisation und Durchführung eines Programmierwettbewerbs
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Christian Rössl
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - Software project FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Key and methodological competences - Software project FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - Software project FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - Design FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: B.Sc. WIF - Key and methodological competences - Software project
Teaching Method / SWS:	Project
Workload:	150 hours of independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Acquisition of advanced knowledge in the field of interactive systems, especially computer gamesAcquisition of practical experience in the design and implementation of software systems, working and communicating in a team, supervising "users", automated evaluation of results if possible
Contents:	The participants design and organise the programming competition for the lecture "Algorithms and Data Structures", which is typically a computer game. For this purpose, a scenario is designed for the competition in which the competition participants (as "users") have to solve algorithmic tasks. This scenario is implemented in a framework with defined interfaces, exemplary solutions, documentation and instructions as well as the possibility of automatic ("offline") evaluation of results. The participants organise the actual competition and the evaluation themselves.
Type of Examination:	Prerequisite: Completion of the programming competition, examination: scientific project, also possible as a certificate
Media:	

Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Estimation for Autonomous Mobile Robots
Engl. module name:	Estimation for Autonomous Mobile Robots
Abbreviation:	AMR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Benjamin Noack
Lecturer(s):	Prof. Benjamin Noack
Language:	english
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercise Independent work: Follow-up study, working on exercises Workload: 180 h = 56 h attendance time + 124 h independent work
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Linear Algebra, Analysis
Intended learning outcomes:	You have an overview of basic problems and methods in parameter and state estimation for mobile systems.You understand how to develop kinematic models for mobile robots and how to derive discrete-time prediction models.You are familiar with the required mathematical tools and can derive and apply least-squares methods for localisation and tracking of mobile systems, e.g., based on distance measurements.You have a good understanding of Kalman filtering and its nonlinear generalizations for dynamic state estimation and localization of mobile systems.
Contents:	Kinematics, System Models, and Dead Reckoning for Mobile SystemsSensor Models and Optimization Methods for Localization and TrackingDynamic State

	Estimation for Real-Time Localization and TrackingLinear Kalman Filtering and Nonlinear Generalizations
Type of Examination:	Oral examination
Media:	Digital Notes, Exercise Sheets
Literature:	Literature will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module Name:	Ethische Herausforderungen im Digitalen Zeitalter
Engl. module name:	Ethical challenges in the digital era
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Karl Teille, Volkswagen AutoUni, Head of the Institute for Information Technology
Lecturer(s):	Dr. Karl Teille, Volkswagen AutoUni, Head of the Institute for Information Technology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - Scientific seminar FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - Scientific seminar FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Key and methodological competences - Scientific seminar FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - Scientific seminar FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: B.Sc. WIF - Key and methodological competences - Scientific seminar FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science Key and methodological competences - Scientific seminar
Teaching Method / SWS:	Lecture
Workload:	Lecture
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	Good knowledge of at least one programming language, VL operating systems, willingness for interdisciplinary work
Intended learning outcomes:	Recognise ethics as a philosophical disciplineBe able to classify ethical questions Understanding aspects of digitalisation as an ethical challenge
Contents:	Definition of ethics Descriptive ethics Justification of ethics Teleological ethics

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The German version is legally binding

	Deontological ethics Opportunities of digitalisation Barriers to the commercial usability of data Ethical challenges in dealing with personal data / metadata Expanding the concept of reality Artificial intelligence and technological singularity Areas of application for digitalisation SalesMobility (autonomous driving; smart cars)Autonomous decisions by machinesIntelligent, networked production, Industry 4.0Autonomous warfare
Type of Examination:	oral examination
Media:	
Literature:	Baumgartner, C.: Die Digitalisierung findet statt. Interview mit August-Wilhelm Scheer. In Computerwelt, 2015, 2015; S. 4. Brantl, S. : Wirtschaftsethik. Beitrag in Gabler Wirtschafts-Lexikon. Gabler, Wiesbaden, 1988. Bundesverfassungsgericht, vom 15.12. 1983, Aktenzeichen 1 BvR 209, 269, 362, 420, 440, 484/83, „Volkszählungsurteil“, zitiert nach [Fili15, S.10] Filipovic, A.: Die Datafizierung der Welt – Eine ethische Vermessung des digitalen Wandels. Communicatio Socialis, 48 Jg. 2015, H.1 Frey, C. B.; Osborne, M.: Technology at Work - The future of innovation and employment. In Citi GPS: Global Perspectives & Solutions, 2015. Hausmanninger, Th./ Capurro, R. (2002): Eine Schriftenreihe stellt sich vor. In Hausmanninger, Th./ Capurro, R. (Hg.): Netzethik. Grundlegungsfragen der Internetethik. München, S.7-12; zitiert nach [Fili15, S. 7] Kurz, C.; Rieger, F.: Arbeitsfrei. Eine Entdeckungsreise zu den Maschinen, die uns ersetzen. Goldmann Verlag, München, 2015. ohne Verfasser: Spielend auf dem Highway. Autonomes Fahren ist das große Thema der Autokonzerne. In ADAC Motorwelt, 2015; S. 10. Reitz, M.: Norbert Wiener – Begründer der Kybernetik. SWR2 Wissen, 17. März 2014 Schwägerl, C.: Offline ist so vorbei. Das Internet kommt uns noch näher. In Zeit online, 03.05.2015. Simanowski, R.: Data Love. Matthes & Seitz, Berlin, 2014. Vack, P.: Self-Drive Cars and You: A History Longer than You Think. VeloceToday.com - The Online Magazine for Italian and French Classic Car Enthusiasts. http://www.velocetoday.com/self-drive-cars-and-you-a-history-longer-than-you-think/, 03.05.2015. Watzlawick, P.: Wie wirklich ist die Wirklichkeit? Wahn, Täuschung, Verstehen. Piper, München, Zürich, 2005. Zeit Online GmbH: Forschungsprojekt: Das 1-Milliarde-Euro-Hirn. http://www.zeit.de/2011/21/Kuenstliches-Gehirn, 08.05.2015.

Module Name:	Eudaimonic Interaction Design
Engl. module name:	Eudaimonic Interaction Design
Abbreviation:	EID
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	

English courtesy translation.
The German version is legally binding

Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. Ernesto William De Luca
Lecturer(s):	Prof. Dr.-Ing. Ernesto William De Luca, Julian Marvin Jörs
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Area Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Seminar
Workload:	Attendance times: weekly block seminar Independent work: 94 hours of independent work (working on exercises; follow-up of the lecture, preparation for the exam) Project for Master students: 30h work on one of the proposed projects in HCNLP Master 180h = 56h (4 SWS) attendance time + 94h independent work + 30h project work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	Services: - Processing the exercises; - Processing the programming tasks; - Successful presentation of the results of the project. Written examination (also for Schein). Preliminary work as specified at the beginning of the semester.
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Fabrikplanung (Factory Operations)
Engl. module name:	Fabrikplanung (Factory Operations)
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Kühnle, FMB-IAF
Lecturer(s):	Prof. Kühnle, FMB-IAF
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture; 1 SWS exercise Independent work: Accompanying self-study Exam preparation
Credit points/ECTS:	4
Prerequisites according to examination regulations:	Information in the introductory lecture
Recommended prerequisites:	
Intended learning outcomes:	Mastering a systemic approach to industrial factory processesAchieving a holistic understanding of factory processes with the help of an explication model for different situations and planning cases Assessment of methods and procedures in the subject area "Factory Operations" with regard to areas of application and practical suitability
Contents:	Basic concepts for planning and designing industrial processesSelection procedures for basic technologies in the processing industry and their areas of application Analysing and evaluating information processes in industrial production Factory processes from an economic perspective, cost functions as an evaluation tool Structure and process organisation of industrial production Strategic corporate planning procedures and their impact on production programmes and factory structures
Type of Examination:	Exercise certificate (internal examination requirement), Written examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Filmseminar Informatik und Ethik
Engl. module name:	Film Seminar - Computer Science and Ethics
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Gunter Saake
Lecturer(s):	Dr. Eike Schallehn
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Area Applications / Humanities Basics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science Students FHW according to the PO there
Teaching Method / SWS:	Seminar
Workload:	Attendance times: 2 SWS Seminar Independent work: Presentation of the films Working through the topic Preparation of a presentation 90h (28h attendance time + 62h independent work)
Credit points/ECTS:	4 - 6 CP, by arrangement
Prerequisites according to examination regulations:	
Recommended prerequisites:	Extensive knowledge of the fundamentals and applications of information systems
Intended learning outcomes:	Learning objectives & acquired competences: Independent development of a challenging topic Oral presentation of a challenging topic Understanding the ethics of the use of information technologies
Contents:	Discussion of questions relating to the ethics of information technology applications, such as Restriction of personal rights Social effects Ethical issues of specific applications (e.g. military, genetic engineering, etc.) Security and trustworthiness of systems using the example of predetermined and self-selected feature films
Type of Examination:	

	Cumulative examination: Presentation and discussion
Media:	Powerpoint, blackboard, video, film presentation
Literature:	Independent research and literature provided

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The German version is legally binding

Module Name:	Geometrische Datenstrukturen
Engl. module name:	Geometric Data Structures
Abbreviation:	GDS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 3 SWS weekly exercise 1 SWS Independent work: Processing the exercises and assigned problems Follow-up of the lecture Literature specialisation 180h = 4SWS = 56h attendance time + 124h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Basic knowledge of algorithms
Intended learning outcomes:	Ability to design efficient data structures for geometric problems and to assess and compare their efficiency
Contents:	Balanced search trees, self-organising search trees, amortised analysis, randomised data structures, interval trees, data structures for range queries, extended data structures, quad trees, fractional cascading, priority queues, segment trees, data structures for point localisation in the plane, persistent data structures, dynamisation of data structures
Type of Examination:	Examination prerequisite: see lecture Exam: oral

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Media:	
Literature:	Samet: Foundations of Multidimensional and Metric Data Structures.Zachmann, Langetepe: Geometric Data Structures for Computer Graphics. Mehta, Sahmi: Handbook of Data Structures and Applica-tions Morin: Open Data Structures: An Introduction

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Module Name:	Grundlagen der Arbeitswissenschaft
Engl. module name:	Fundamentals of Ergonomics
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dipl.-Ing. Brennecke; FMB-IAF
Lecturer(s):	Dipl.-Ing. Brennecke; FMB-IAF
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS tutorial Independent work: Accompanying self-study, exam preparation
Credit points/ECTS:	4
Prerequisites according to examination regulations:	Timely enrolment for the module Examination prerequisite: Exercise certificate Exam: Written exam K90
Recommended prerequisites:	
Intended learning outcomes:	Recognising the connections between people, technology and organisation in engineering activitiesTeaching methods and standards for the humane and economic design of work Acquisition of self-competence for one's own professional behaviour along the career path
Contents:	Subject matter, definition, objectives and components of ergonomicsPhysiological and psychological principles of work Work design disciplines: workplace design (dimensioning of workstations, design of VDU work), work environment design (noise, lighting), work organisation (design of work tasks and work content, innovative, participative work and employment concepts), work management (time management) Occupational health and safety
Type of Examination:	Examination prerequisite: Exercise certificate Exam: Written exam K90
Media:	
Literature:	

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Module Name:	Grundlagen der Bildverarbeitung / Computer Vision
Engl. module name:	Basics of Image Processing / Computer vision
Abbreviation:	GrBV
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Prof. Dr. Alexander Binder
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercise preparation in small groups Preparation and follow-up of the lecture material 150h = 4SWS = 56h attendance time + 94h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Knowledge of linear algebra Willingness to familiarise yourself with Python.
Intended learning outcomes:	- measure the predictive quality of trained models on test data - to be able to fine-tune models on training data - To be able to provide an overview of problems and solution approaches in the field of computer vision and multimodal image/text-based solutions with the help of deep learning. - Being able to decide which model class can be usefully applied to which problems
Contents:	This course will be conducted in PyTorch and Python and will utilise deep learning methods. Generalisation to test data Convolutional neural nets Data augmentation, fine-tuning, basic knowledge of adversarial attacks

	Vision transformer Object detection and segmentation few-shot predictions some approaches with so-called "foundational models" and multimodal models that go beyond a fixed set of categories, such as CLIP and GroundingDino
Type of Examination:	Examination prerequisite is required Exam: Written exam 120 min.
Media:	
Literature:	see http://wwwisg.cs.uni-magdeburg.de/bv/gbv/bv.html

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Module Name:	Grundlagen der Biologie
Engl. module name:	Grundlagen der Biologie
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	FNW, Prof. K. Braun, Prof. Stork
Lecturer(s):	FNW, Prof. K. Braun, Prof. Stork
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology Lecture: winter semester / practical course: summer semester Lecture is compulsory, practical course optional
Teaching Method / SWS:	Lecture; practical course
Workload:	Attendance times: 2 SWS Lecture 2 SWS Internship Independent work: Reviewing the lecture Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28h attendance time + 62h independent work) Internship: 3 CP = 90 h (28 h attendance time + 62 h independent work)
Credit points/ECTS:	Lecture: 3 Internship: 3
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics I
Intended learning outcomes:	Students acquire an overview of the content and principles of general biology, zoology, cell biology, molecular biology, genetics, human biology and the ability to solve interdisciplinary problems. In the practical course, students acquire skills, e.g. in the safe preparation of samples, the use of special measuring techniques and methods and micro-working techniques.
Contents:	Lecture: General zoology, animal physiology, neurobiology Cell biology, biochemistry of the cell, genetics Behavioural biology Developmental biology Internship: Histology/cytology Introduction to histological preparation techniques and staining procedures

	Classification of coloured fabrics In vitro methods Immunocytochemistry/enzyme histochemistry Quantification methods in histology Introduction to confocal laser scanning microscopy Introduction to electron microscopy Introduction to biochemistry
Type of Examination:	Lecture: Written exam 2h. Internship certificate
Media:	
Literature:	Will be announced in the lecture

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The German version is legally binding

Module Name:	Grundlagen der Fahrzeugtechnik
Engl. module name:	Basics for Automotive Technology
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Mechanical Engineering: https://www.verwaltungshandbuch.ovgu.de/Modulhandb%C3%BCcher-media_id-12598.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof Rottengruber, FMB-IMS
Lecturer(s):	Prof Rottengruber, FMB-IMS Dr Tommy Luft, FMB-IMS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching Method / SWS:	Lecture; Exercise
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

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Module Name:	Grundlagen der Theoretischen Informatik
Engl. module name:	Introduction to the Theory of Computation
Abbreviation:	GTI
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Theoretical Computer Science / Formal Languages / Automata Theory, Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Compulsory subjects FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Understanding & Design
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 2 SWS Exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 5 SWS = 70h attendance time + 80h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Application of the basics of automata theory and formal languages for problem solving Ability to assess and classify problems in terms of predictability and complexity
Contents:	Introduction to formal languages (regular languages and grammars), elementary automata theory (finite automata, basement automata), computational models and Church's thesis, decidability and semi-decidability, complexity classes P and NP, NP-completeness
Type of Examination:	Examination prerequisites: see lecture Exam: Written exam 120 min.

Media:	
Literature:	Hopcroft, Motwani, Ullmann; Einführung in der Automatentheorie, Formale Sprachen und KomplexitätstheorieLewis, Papadimitriou; Elements of the Theory of Computation Sipser; Theory of Computation.

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Module Name:	Grundlagen der Theoretischen Informatik III
Engl. module name:	Introduction to the Theory of Computation III
Abbreviation:	GTI III
Notes:	Course is offered every 2nd winter semester
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 1 SWS Exercise Independent work: Processing the exercises Follow-up of the lectures 180h = 4 SWS = 56h attendance time + 124h independent work.
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Fundamentals of Theoretical Computer Science I + II
Intended learning outcomes:	Dealing with difficult algorithmic problems Ability to assess and classify complex problems more accurately in terms of calculability and complexity.
Contents:	Deterministic context-free languages, Kleene algebras, exact and approximation algorithms for hard problems, Probabilistic Turing machines, Circuit families, further complexity classes.
Type of Examination:	Examination prerequisites: see lecture Exam: Written exam 120 min.
Media:	

Literature:	Sipser; Theory of Computation Kozen; Automata and Computability

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Module Name:	Grundlagen des Industriedesigns
Engl. module name:	Grundlagen des Industriedesigns
Abbreviation:	ID module 1
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	Lecture: Industrial Design Exercise: Fundamentals of Visual Design
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Lecturer(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture (WS) 2 SWS Exercise - Basics of Visual Design (WS+SS) Independent work: 2 hours/week for paperwork 150h=4 SWS=56h attendance time+94h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Interest in design aspects of product and environmental design as well as own design activities
Intended learning outcomes:	Learning objectives and acquired competences Knowledge and basic skills in industrial design Introduction to the way of thinking and design in industrial design when developing products Sensitisation to formal aesthetic qualities and training in design skills for surface design
Contents:	Design as part of product qualityHuman-centred design requirements and usage processes (aesthetics and ergonomics) Methodology of the design process and its interfaces to the integrated product development process Design tools: function and use in the design process Visualisation techniques in the design process Property rights in design practice Design practice - examples History of functional design 15 Exercises for area design
Type of Examination:	The module contains two parts: Lecture: Complete participation in the course (attendance check)

	Exercise: Assessment of all exercises An overall grade is calculated from both performance components.
Media:	
Literature:	

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The German version is legally binding

Module Name:	Hardwarenahe Rechnerarchitektur für CV, BIT
Engl. module name:	Hardware-related computer architecture for CV, BIT
Abbreviation:	HWRA-CV,BIT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Hardware-related Computer Engineering
Lecturer(s):	Dr Gerald Krell
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology
Teaching Method / SWS:	Lecture; Exercise; Practical course
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise, 1 SWS Internship Independent work: Exercise and internship preparation, consultation 180h = 4 SWS = 56 h attendance time + 124 h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	Internship certificate
Recommended prerequisites:	Attendance of the preceding courses in the field of computer engineering
Intended learning outcomes:	- Understanding of the processes in the computer and the associated peripherals at signal level - Development of the ability to complete computers with suitable interfaces or to use them as embedded hardware - Familiarisation with elements of programmable logic - Developing an understanding of the functions of image input and output interfaces
Contents:	- Structure and function of basic elements - Hardware aspects of data paths - Computer design basics - RISC, CISC, machine instructions - Bus systems - Ports, semiconductor memory - Addressing of memory cells and ports - Direct memory access, cache memory - Classification according to Flynn - Analogue interfaces, image input/output - Signal processors - Application of single-chip controllers, systems on chip (SOCs) - High-level synthesis of programmable logic

	- Embedded Vision
Type of Examination:	Services: Internship certificate Exam: written (2h)
Media:	Elearning, projector
Literature:	see script

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The German version is legally binding

Module Name:	Human Factors
Engl. module name:	Human Factors
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	Labour science
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Deml
Lecturer(s):	Brennecke, Deml
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: Lecture: 2 SWS, Exercise: 1 SWS Independent work: Follow-up of the lectures Preparation for the written exam 75 h (42 h attendance time + 33 h independent work)
Credit points/ECTS:	3
Prerequisites according to examination regulations:	Participation in lectures Passing the written exam
Recommended prerequisites:	
Intended learning outcomes:	The aim of the course is to convey the relationships between people, technology and organisation that are relevant to engineering activities. The participants should acquire methods and standards in order to be able to organise work in a humane way. The need to plan and design the human-technology-organisation relationship in such a way that human performance potential can be optimally utilised and developed in a targeted manner and that there are no harmful or detrimental effects on people's health and well-being is conveyed. In this way, economic efficiency can be realised in unity with the humanity of work. For engineers who are not specialists in work design, the courses offer the fundamentals of labour science and guidelines and impulses for action.
Contents:	Subject matter, definition, objectives and components of ergonomicsPhysiological and psychological principles of work Workplace design Organisation of VDU work Work environment design (noise, lighting) Work organisation Human information processing Human-machine interaction

	Human reliability and errors Time management Occupational health and safety
Type of Examination:	Written examination
Media:	Powerpoint
Literature:	Will be provided in the lecture

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Module Name:	Human-Centred Approaches and Technologies
Engl. module name:	Human-Centred Approaches and Technologies
Abbreviation:	HCAT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Ernesto W. De Luca
Lecturer(s):	Ernesto W. De Luca / Erasmo Purificato
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Area Applications / Humanities Foundations FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Seminar; Project
Workload:	Master 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work Attendance times: weekly seminar: 2 SWS / weekly project: 2 SWS Independent work: 98h independent work (readings; follow-up of the lecture, preparation of paper, reviews and presentation as part of the exam). Project: 30h work on one of the proposed projects in HCAT. 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Machine Learning Information Retrieval Data Science Data Mining Fundamentals of Natural Language Processing Introduction to Deep Learning Human-Centred Artificial Intelligence
Intended learning outcomes:	Understanding of scientific writing Ability to evaluate scientific papers Involvement in scientific conferences Familiarity with online submission and review platforms
Contents:	Scientific Writing

	Understanding of Scientific Conferences Reviewing papers and related process Conducting a comprehensive systematic research literature review Evaluating research papers and the work of fellow students Delivering a final presentation and paper, which could be presented on a conference event Topics: Human-Centred Artificial Intelligence and Human-Centred Design
Type of Examination:	Scientific paper Reviews on other papers Presentation of the own results presented in the paper.
Media:	
Literature:	- V. Dignum, “Responsible Artificial Intelligence – How to Develop and Use AI in a Responsible Way”, Springer, 2019. - B. Shneiderman, “Human-Centered AI”, Oxford University Press, 2022. - A. Schmidt, “Interactive Human Centered Artificial Intelligence: A Definition and Research Challenges”. - S. Barocas et al., “Fairness and Machine Learning”, 2019. - Documents related to Certification as Professional for Usability and User Experience (CPUX) https://uxqb.org/en/documents/

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Module Name:	Human-Centred Natural Language Processing
Engl. module name:	Human-Centred Natural Language Processing
Abbreviation:	HCNLP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. Ernesto William De Luca
Lecturer(s):	Prof. Dr.-Ing. Ernesto William De Luca
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Area Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Seminar
Workload:	Attendance times: weekly block seminar Independent work: 98 hours of independent work (working on exercises; follow-up work on the lecture, preparation for the exam) Project for Master's students: 30 hours of work on one of the proposed projects in HCNLP Master 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Human-Centred NLP principles; Language Representation and Language Engineering, NLP Models (rule-based, count-based, prediction-based); Dataset Creation and Curation; Human-Computer Interaction, Human-Centred Evaluation of NLP Systems, Human-Centred Design, Human-Centred NLP Applications, Human-AI Collaboration
Contents:	- What is Human-Centred Natural Language Processing - Traditional Natural Language Processing: Rule-based and Count-based Models - Modern Natural Language Processing: Prediction-based Models - Language Engineering - Dataset Creation

	- Dataset Curation with Human Values in Mind - Human-Computer Interaction - Human-Centred Evaluation of NLP Systems - Human-Centred Design of NLP Systems - Human-Centered NLP Applications: Digital Humanities, Legal Artificial Intelligence, Recommender Systems - Human-AI Collaboration and Future Directions
Type of Examination:	Requirements: - Processing the exercises; - Processing the programming tasks; - Successful presentation of the results of the project. Written examination (also for Schein). Preliminary work as specified at the beginning of the semester.
Media:	
Literature:	- Manning, C., & Schutze, H. (1999). Foundations of statistical natural language processing. MIT press. - Ziems, C., Yu, J. A., Wang, Y. C., Halevy, A., & Yang, D. (2022). The moral integrity corpus: A benchmark for ethical dialogue systems. arXiv preprint arXiv:2204.03021. - Niven, T., & Kao, H. Y. (2019). Probing neural network comprehension of natural language arguments. arXiv preprint arXiv:1907.07355. - Belz, A., Thomson, C., Reiter, E., Abercrombie, G., Alonso-Moral, J. M., Arvan, M., ... & Yang, D. (2023). Missing information, unresponsive authors, experimental flaws: The impossibility of assessing the reproducibility of previous human evaluations in NLP. arXiv preprint arXiv:2305.01633. - Bansal, G., Wu, T., Zhou, J., Fok, R., Nushi, B., Kamar, E., ... & Weld, D. (2021, May). Does the whole exceed its parts? the effect of ai explanations on complementary team performance. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (pp. 1-16).

English courtesy translation.
The German version is legally binding

Module Name:	IDE-Projekt I-III
Engl. module name:	IDE-Projekt I-III
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Master's degree programmes at the Faculty of Mechanical Engineering: https://www.verwaltungshandbuch.ovgu.de/Modulhandb%C3%BCcher-media_id-2618.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Prof. Dr.-Ing Christiane Beyer, FMB-IMK
Lecturer(s):	Prof. Dr.-Ing. Christiane Beyer, FMB-IMK Further lecturers: Dipl.-Designer Matthias Trott, FMB-IAF, Dr.-Ing. Dipl.-Math. Michael Schabacker, FMB-IMK, Dr.-Ing. Ramona Träger, FMB-IMK
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: B.Sc. CV - General Visualistics - Design
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

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Module Name:	Image Coding
Engl. module name:	Image Coding
Abbreviation:	IC
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Gerald Krell
Lecturer(s):	Dr. Gerald Krell
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. INGINF - Engineering Informatics
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS (2 SWS lecture + 1 SWS exercise) = 150h = 42h attendance time + 108h independent work Independent work: Lecture follow-up, exercises, exam preparation
Credit points/ECTS:	5 Grading scale according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics/physics for engineers/computer scientists or similar, basics of information technology, basics of electronics
Intended learning outcomes:	Learning objectives & competences to be acquired: The aim of the course is to familiarise students with the basic methods and techniques of image coding as an essential task in image communication. Problems of image acquisition are explained insofar as they are relevant to image coding, and the increasingly important content-orientated (semantic) techniques are dealt with on the basis of signal and information theory methods.
Contents:	Basics, lossless coding, lossy coding Coding, semantic coding, standards
Type of Examination:	Exam: oral (30 min)
Media:	
Literature:	see script

Module Name:	Implementierungstechniken für Software-Produktlinien

Engl. module name:	Implementation Techniques for Software Product Lines
Abbreviation:	ISP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Gunter Saake
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	5 CP: 150h = 56h attendance + 94h independent work 6 CP: 180h = 150h + 30h additional tasks
Credit points/ECTS:	Bachelor: 5 CP Master: 6 CP
Prerequisites according to examination regulations:	Regular participation in lectures and exercises. Oral examination at the end of the module and project work. Cannot be taken together with "Advanced Programming Concepts for Tailor-Made Data Management" or "Advanced Programming Concepts for Tailor-Made Data Management" (old name).
Recommended prerequisites:	The basics of software engineering are a prerequisite; Basic knowledge of compiler construction and concepts of Programming languages are recommended
Intended learning outcomes:	Understanding of the limitations of traditional programming paradigms with regard to the development of information systemsKnowledge of modern, extended programming paradigms with a focus on the creation of customised systems Ability to evaluate, selection

English courtesy translation.
The German version is legally binding

Contents:	Introduction to the problem of customised systems using the example of embedded DBMS modelling and implementation of software product lines Introduction to basic concepts (e.g. separation of concerns, information hiding, modularisation, structured programming and design) Overview of advanced programming concepts including components, design patterns, meta-object protocols and aspect-orientated programming, collaborations and feature-orientated programming
Type of Examination:	Lecture and lecture-accompanying exercise with questionnaires including a programming practical on a selected topic of the lecture; independent work on the exercises and the selected topic as a prerequisite for the examination Examination/Certificate: oral
Media:	
Literature:	Feature-Oriented Software Product Lines: Concepts and Implementation. Sven Apel, Don Batory, Christian Kästner, Gunter Saake, October 2013, ISBN: 978-3-642-37520-0, Springer-Verlag

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The German version is legally binding

Module Name:	Industriedesign-Designprojekt
Engl. module name:	Industriedesign-Designprojekt
Abbreviation:	ID module 3
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	Exercise: 1st design project
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Lecturer(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design FIN: M.Sc. CV - Area Applications / Humanities Basics
Teaching Method / SWS:	Exercise
Workload:	Attendance times: 3 SWS Exercise - Design project (WS+SS) Independent work: 8 hours/week for project work150h=3 SWS=42h attendance time+108h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Interest in design aspects of product and environmental design as well as own design activities Successful completion of ID module 1 and 2
Intended learning outcomes:	Learning objectives and acquired competences Advanced skills and abilities in drawing and computer-aided design drafting Expertise in design methodologies in industrial design in interdisciplinary teams
Contents:	Methodically supported design of products and environmental situationsClassical and computer-aided visualisation techniques Acquisition of advanced skills in the use of the CAID software Alias/Wavefront Studio Tools Complex visualisations with interfaces to CAD systems and image design Complex product design-Collaboration in an interdisciplinary team (IPE project/design project)
Type of Examination:	Graded evaluation of the project work (presentation and project documentation)
Media:	

Literature:	

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The German version is legally binding

Module Name:	Information Retrieval
Engl. module name:	Information Retrieval
Abbreviation:	IR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing Andreas Nürnberger
Lecturer(s):	Prof. Dr.-Ing Andreas Nürnberger
Language:	english
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Methods II area
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Completion of exercises and programming tasks; follow-up of the lecture 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Participation requirements: Algorithms and data structures
Intended learning outcomes:	In-depth understanding of information retrieval problemsKnowledge of data structures and algorithms that enable the student to independently develop and evaluate information retrieval systems.Master: Additional experience in the use of Word Embeddings
Contents:	Statistical properties of texts, retrieval models and data structures, relevance feedback, evaluation, basics of XML, structuring of data collections (clustering, categorisation), structure and algorithms of internet search engines, basics of multimedia retrieval systems, interface design
Type of Examination:	

	Requirements: Preliminary work as specified at the beginning of the semester (voting, programming tasks) Examination: written (also for certificate)
Media:	
Literature:	Introduction to Information Retrieval, C.D. Manning, P. Raghavan, H. Schütze, Cambridge University Press, 2008.Information Retrieval: Data Structures and Algorithms, William B. Frakes and Ricardo Baeza-Yates, Prentice-Hall, 1992.

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Module Name:	In-Memory und Cloud-Technologien 1
Engl. module name:	In-Memory und Cloud-Technologies 1
Abbreviation:	IMCloud 1
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Abdulrahman Nahhas
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture
Workload:	Attendance times = 20 h: -20 h Lecture Independent work = 70 h: -20 h Preparation for the lecture - Reading the recommended literature 50 h follow-up of the lecture - preparation of a scientific short paper/poster
Credit points/ECTS:	3 credit points = 3*30 h = 90 h (20 h attendance time + 70 h independent work) Grading scale according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	Course "Databases I" and "Databases II"
Intended learning outcomes:	Learning objectives & acquired competences: -Introduction: In-memory technology with a focus on SAP HANA -Introduction: Cloud technology with a focus on Google Cloud -Digital Decoupling on Cloud for SAP Systems
Contents:	In-memory technology and applications with a focus on SAP HANA: -Explanation of in-memory technology with a focus on SAP HANA -Row versus column main memory databases -Compression, partitioning and indexing approaches Google Cloud technology and services, use of e.g. Anthos, Bigquery, and AutoML. The number of participants for the seminar is limited to 20 people.
Type of Examination:	Admission to the examination: The conditions will be announced at the beginning of the course. Type of examination: oral examination

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Media:	
Literature:	Plattner, H., Zeier, A.: In-Memory Data Management: Technology and Applications, Springer Verlag, 2nd edition, May 2012, ISBN 978-3642295744 Whitepaper "HANA on Intel: Three Steps to Reinvent Your Enterprise as a Digital Disrupter" by Prof. Dr. Alexander Zeier & Intel CTO Enterprise Ed Goldman, 2016. Cloud Computing, Blog (July 2020) on Digital Decoupling. Title: Trapped by legacy systems, CIOs look for a way out https://www.accenture.com/us-en/blogs/cloud-computing/zeier-digital-decoupling-sap-google-cloud

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Module Name:	In-Memory und Cloud-Technologien 2
Engl. module name:	In-Memory and Cloud Technologies 2
Abbreviation:	IMCloud 2
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	
Semester:	M.Sc. from 1st semester
Duration:	
Frequency:	
Module Coordinator(s):	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Hon. Prof. Dr. Alexander Zeier Venue: Kronberg (Frankfurt am Main)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture
Workload:	Attendance time = 40 h: -40 h Lecture Independent work = 50 h: -50 h Preparation and follow-up of the lecture
Credit points/ECTS:	3 credit points = 3*30 h = 90 h (40 h attendance time + 50 h independent work) Grading scale according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	Course "Databases I" and "Databases II" - optional
Intended learning outcomes:	Learning objectives & acquired competences: -Specialisation: In-memory technology with a focus on SAP HANA
Contents:	In-memory technology and applications with a focus on SAP HANA: Development of high-availability solutions and backup strategies -Extension of the data layout without downtime -Migration approaches for projects in which in-memory databases are used Due to the provision of and access to the licensed SAP HANA system and other chargeable applications, the number of participants at the event is limited.
Type of Examination:	Examination Prequisites: -Participation in the event Examination form: -Written examination
Media:	

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Literature:	Plattner, H., Zeier, A.: In-Memory Data Management: Technology and Applications, Springer Verlag, 2. Auflage, Mai 2012, ISBN 978-3642295744 Whitepaper "HANA on Intel: Three Steps to Reinvent Your Enterprise as a Digital Disrupter" von Prof. Dr. Alexander Zeier & Intel CTO Enterprise Ed Goldman, 2016. Cloud Computing, Blog (July 2020) zu Digital Decoupling. Title: Trapped by legacy systems, CIOs look for a way out https://www.accenture.com/us-en/blogs/cloud-computing/zeier-digital-decoupling-sap-google-cloud

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Module Name:	Intelligente Systeme
Engl. module name:	Intelligent Systems
Abbreviation:	IS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Practical Computer Science / Computational Intelligence
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Compulsory subjects FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Self-employed work = 94 hours: Preparation and follow-up of lectures and exercises Work on exercises and programming tasks
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics I to IV
Intended learning outcomes:	Ability to model and create knowledge-intensive applications by selecting modelling techniques appropriate to the problem Application of heuristic search methods and learning systems to cope with large amounts of data Ability to develop and evaluate intelligent and decision-support systems Evaluation and application of modelling approaches for the development of cognitive systems
Contents:	Properties of intelligent systems Modelling techniques for knowledge-intensive applications Subsymbolic solution methods Heuristic search methods Learning systems Modelling approaches for cognitive systems Knowledge revision and ontologies Decision support systems Other current methods for the development of intelligent systems such as causal networks, fuzzy reasoning
Type of Examination:	Examination in written form, duration: 2 hours, necessary preliminary work will be announced in the first week of the course and on the lecture websiteCertificate: written or oral, necessary preliminary work will be announced in the first week of the course and on the lecture website

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Media:	
Literature:	Christoph Beierle und Gabriele Kern-Isberner. Methoden Wissensbasierter Systeme (5. Auflage). Vieweg Verlag, 2014. Stuart J. Russell und Peter Norvig. Künstliche Intelligenz: Ein moderner Ansatz (2. Auflage). Pearson Studium, 2012 Rudolf Kruse et al., Computational Intelligence, 2. Auflage, Springer-Vieweg, 2015

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Module Name:	Intercultural Workshop: Studying at OvGU - Differences and Similarities in Turkish and German higher education
Engl. module name:	Intercultural Workshop: Studying at OvGU - Differences and Similarities in Turkish and German higher education
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Mesut Günes
Lecturer(s):	Prof. Mesut Günes
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF
Teaching Method / SWS:	Block event
Workload:	30h
Credit points/ECTS:	1 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Programme structure and study techniques Communication and collaboration Effective and efficient study and examination planning Studying successfully in Germany
Contents:	Study planning & successful study Goals & goal-orientated action Time management & scheduling Think and act independently Successful semester and study planning Successful exam preparation and follow-up Cultural differences/ similarities between Germany and Turkey Study-related differences/similarities between Germany and Turkey
Type of Examination:	-
Media:	
Literature:	

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Module Name:	Interdisziplinäres Teamprojekt
Engl. module name:	Interdisciplinary Team Project
Abbreviation:	ITP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 2nd semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	supply-specific
Lecturer(s):	supply-specific
Language:	---
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Interdisciplinary team project
Teaching Method / SWS:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 180h = 12 weeks of 14 hours each
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	supply-specific
Intended learning outcomes:	The aim of this "small" project is not only to deepen students' knowledge of the fundamentals in a complementary scientific field, but above all to develop key skills in interdisciplinary work on the basis of a defined task that students work on in a team.
Contents:	This module is taught by various university lecturers implemented. The technical contents are therefore supply-specific.
Type of Examination:	supply-specific
Media:	
Literature:	

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Module Name:	Introduction to Computer Graphics
Engl. module name:	Introduction to Computer Graphics
Abbreviation:	ICG
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. VC - Visual Computing - Compulsory subjects (can only be credited if the German-language Bachelor course Computer Graphics I has not previously been taken)
Teaching Method / SWS:	Lecture; Exercise
Workload:	In class teaching: * 2 SWS lecture / 2 SWS exercise Self-study: * Self-study of lecture material * Solution of exercises and assignments
Credit points/ECTS:	6 credit points = 180 h (56h in class + 124h self-study), grading scheme according to exam regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Acquire basic knowledge of the most important algorithms in computer graphics.Recognition of basic principles of computer graphics enables fast familiarisation with new graphics packages and graphics librariesAbility to use graphical approaches for various computer science applications
Contents:	Introduction, history, application areas of Computer graphicsModeling and acquisition of graphical dataTransformationsClippingRasterisation and antialiasingLightingTexturingVisibilityRay tracingModern concepts of computer graphics at a glance
Type of Examination:	Exam. requirements:Successful completion of the exercisesCompleting a programming task Exam: Written exam 120 min. Exam certificate (Schein): Passing the exam
Media:	

Literature:	J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes: Computer Graphics – Principles and Practice (second Edition). AddisonWesley Publishing Company, Inc., 1996J.Encarnacao, W. D. Salomon: Computer Graphics Geometric Modeling, Springer, 1999A. Watt: 3D Computer Graphics. Addison-Wesley Publishing Company, Inc., 2000

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Module Name:	Introduction to Computer Science for Engineers
Engl. module name:	Introduction to Computer Science for Engineers
Abbreviation:	ICSE
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr.-Ing. Christian Braune
Lecturer(s):	Dr.-Ing. Christian Braune
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching Method / SWS:	Lecture; Exercise
Workload:	180 h (70 h contact hours + 110 h complementary reading and realisation of the exercises/assignments)
Credit points/ECTS:	6 credit points Grades according to the examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge and Understanding: - Understand the principles of object-oriented programming. - Understand and recognise the fundamental data structures such as lists, stacks and queues, trees (binary trees, searchtrees and AVL trees), hash tables and graphs. - Understand and recognise methods to observe algorithm complexity or performance. - Understand and recognise the basic algorithms for sorting and searching. - Comprehend the fundamental types of algorithm design paradigm such as Divide-and-Conquer, Greedy, Backtracking and Searching, and Dynamic Programming. Intellectual and Practical Skills: - Distinguish the different types of data structures and algorithm design paradigm evaluate when an algorithmic design situation calls for it. - Select appropriate algorithms for basic tasks such as searching and sorting. - Design new algorithms or modify existing ones for new application and reason about the efficiency of the result. - Program, test and debug computer programs in Python. Communication and Interpersonal Skills: - Presentation of work and ideas during the tutorials / exercises. - Interact with a team and tutors during the tutorials.
Contents:	Introduction to: - imperative programming paradigm - basic concepts of object-oriented programming - programming in a commonly used programming language (e.g. Java, Python) - generic programming

	- fundamental data structures: -- trees (binary trees, search-trees and AVL trees) -- hash tables -- graphs - abstract data types: lists, stacks, queues - main algorithms for fundamental tasks such as sorting and searching - methods to observe algorithm complexity or performance (Big-O notation). - fundamental types of algorithm design paradigms: Divide-and-Conquer, Greedy, Backtracking and Searching, and Dynamic Programming
Type of Examination:	Prerequisites for admission to exam: successful completion of assignments (voting & assessment) Written examination, 120 min
Media:	Git, live coding, MOOCs, bar camp
Literature:	Computer Science - An Interdisciplinary Approach, R. Sedgewick and K. Wayne, Addison-Wesley, 2016, ISBN 0-13-407642-7 Algorithms, 4th Edition, R. Sedgewick and K. Wayne, Addison-Wesley, 2011, ISBN 0-321-57351-X Data Structures and Algorithm in Java, 6th Edition, M.T. Goodrich and R. Tamassia and M.H. Goldwasser, Wiley, 2014, ISBN 1-118-77133-4

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The German version is legally binding

Module Name:	Introduction to Simulation
Engl. module name:	Introduction to Simulation
Abbreviation:	ItS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Models department
Teaching Method / SWS:	Lecture; Exercise
Workload:	150 hours (56 h attendance time + 94 h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics I - III
Intended learning outcomes:	Ability to carry out a semester-long project using the basics of simulation, event-oriented modelling and programming, abstract modelling and applications of computer science in other subject areas Master: Additional experience in the application of agent-based modelling and simulation. (ABMS)
Contents:	Introduction to the basics and steps of simulation studies: - event-orientated simulation - Random variables, random number generation - Statistical data analysis - ordinary differential equations & numerical integration - stochastic Petri nets - AnyLogic simulation system - Discrete-time Markov chains - Agent-based simulation Exercises and implementation of a semester-long project with a focus on discrete and continuous modelling and simulation (questions on this in the exam) Master: Addition to the semester project using agent-based methods

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Type of Examination:	Graded: Written exam of 120 min., for Master extra question on ABMS Ungraded: pass the written exam, 120 min
Media:	
Literature:	Banks, Carson, Nelson, Nicol: Discrete-Event System Simulation See www.sim.ovgu.de

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Module Name:	IT forensics
Engl. module name:	IT Forensics
Abbreviation:	IFOR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship of Applied Computer Science, Multimedia and Security
Lecturer(s):	Prof. Dr.-Ing Jana Dittmann, FIN-ITI
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	4 SWS = 150h = 56h attendance time + 94h independent work
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Fundamentals of Algorithms and Data Structures, Fundamentals of Theoretical Computer Science, Fundamentals of Computer Engineering, "Secure Systems" module
Intended learning outcomes:	- Ability to organise, conduct, document and moderate IT forensic investigations based on a data-centric process model using a simplified example - Ability to customise, adapt and further develop IT forensic methods
Contents:	- Fundamentals of IT forensic investigations: data-centred process model with information, data and phases for IT forensic investigations, application to selected examples - Security objectives, design requirements and selected legal aspects in IT forensics - Selected examples of evidence search, collection and evaluation according to best practices - Basics for the preparation, documentation and presentation of examination results
Type of Examination:	Examination form: presentation (presentation and final report)
Media:	
Literature:	see: https://omen.cs.uni-magdeburg.de/itiamsl/lehre/

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Module Name:	IT-Security of Cyber-Physical Systems
Engl. module name:	IT-Security of Cyber-Physical Systems
Abbreviation:	ITS-CPS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	english
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Project
Workload:	Project lecture on selected technical topics of IT security; assignment of a challenging topic for independent work on and solution of a given task 4 SWS = 2V + 2Ü (laboratory) Workload: 180 hours (56 hours attendance + 124 hours independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired competences: Within the course, the student should acquire and experience knowledge of current, selected technical topics in IT security. A challenging topic is to be worked on independently in theory and practice and presented. The focus of the topics is on hardware-related issues, e.g. IoT security, automotive IT security or security considerations for industrial control and regulation systems
Contents:	Current IT security challenges and solutions for selected technical topics such as from: System, network and application security Security of bus systems Specification and formal verification of secure systems Design and realisation of hardware-related security solutions
Type of Examination:	Examination form: presentation (presentation and final report)
Media:	
Literature:	See: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

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Module Name:	Laborrotation in Neurobiologischer Lernforschung
Engl. module name:	Lab Rotation in neurobiological learning research
Abbreviation:	LR NL
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 6th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. André Brechmann, LIN
Lecturer(s):	Dr. André Brechmann, LIN
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing
Teaching Method / SWS:	Internship
Workload:	Attendance time: 60 h Project Pre- and post-processing of the project 90h = 60h attendance time + 30h independent work
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	Participation in the seminar "Experimental approaches in neurobiological learning research"
Intended learning outcomes:	Learning objectives & competences to be acquired: Practical experience of approaches to neurobiological research on humans or animals, including reinforcement learning, sequence learning, category learning, short-term memory processes
Contents:	As part of ongoing research projects at the Leibniz Institute, we are working on the development and implementation of neurobiological learning experiments using fMRI, MEG, EEG and electrophysiology. The main focus of data evaluation is the time series analysis of neuronal and behavioural data
Type of Examination:	Examination: Oral examination
Media:	
Literature:	see https://iwebdav.ifn-magdeburg.de/iwebdav/LearningAndMemorySeminar/

English courtesy translation.
The German version is legally binding

Module Name:	Logistikprozessanalyse
Engl. module name:	Logistikprozessanalyse
Abbreviation:	L3
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Logistics
Lecturer(s):	Prof. Dr.-Ing. habil. Dr.-Ing. E. h. Michael Schenk, Dr.-Ing. Elke Glistau
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering Specialisations - Mechanical Engineering Specialisation Logistics
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: Weekly lecture 2 SWS 14 daily exercise 1 SWS Independent work: Exercises and exam preparation Document processing 150 h (42 h attendance time + 108 h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Modules L1, L2 (Technical Logistics)
Intended learning outcomes:	Learning objectives & competences to be acquired: As a controller and consultant, the training focus of module L3 is on identifying and proving errors and weak points in logistics processes and systems on the one hand, and on recognising potential and trends on the other, in order to subsequently derive suitable improvement measures in the strategic, tactical and operational areas, implement them and monitor their effectiveness.
Contents:	The starting point is data collection. The general focus here is on minimising the effort involved while ensuring that the data material is up to date and representative. The methodological procedure for carrying out goods-related, resource-related and flow system analyses is explained in classroom sessions. Sample tasks are used to train the calculation of basic statistical parameters and key figures as well as their interpretation. Analytical methods of quality management are also used, especially for visualisation and interpretation (from tally lists to Ishikawa diagrams). The range of methods is supplemented by forecasting methods (including regression) and classification methods (including cluster analysis). Business reengineering and kaizen techniques are explained to derive improvement measures and the role and usability of benchmarking to identify best practices are discussed. Preventive methods form the conclusion. They can be used to plan new logistics processes and systems as well as to optimise existing ones. They are essentially used to systematically record customer requirements in order to quantify the target values for logistics services (QFD) and subsequently initiate the correct (effective and efficient) measures for error prevention (Poka Yoke, SPC) by

	researching potential error possibilities (FMEA) and their dependencies. The individual assignment to be completed during the semester includes the independent determination of relevant key figures from the procurement sector, their calculation and subsequent interpretation using e-learning.
Type of Examination:	Proof of participation in the exercises; Quality of the processed document task Written exam at the end of the module
Media:	
Literature:	Lecture notes in the password-protected download area

English courtesy translation.
The German version is legally binding

Module Name:	Logistikprozessanalyse
Engl. module name:	Machine Learning
Abbreviation:	ML
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lecture: 2 SWS / weekly exercise: 2 SWS Independent work: Completion of exercises; follow-up of the lecture, preparation for the exam150h = 4 SWS = 56h attendance time + 94h independent work
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Prerequisites for participation: "Algorithms and Data Structures"
Intended learning outcomes:	Introduction to function learning; introduction to concept spaces and concept learning; algorithms for instance-based learning and cluster analysis; algorithms for building decision trees; Bayesian learning; neural networks; association analysis; reinforcement learning; hypothesis evaluation. Master: Additional experience in the optimisation of hyperparameters
Contents:	Introduction to function learning; introduction to concept spaces and concept learning; algorithms for instance-based learning and cluster analysis; algorithms for building decision trees; Bayesian learning; neural networks; association analysis; reinforcement learning; hypothesis evaluation Master: Additional optimisation of hyperparameters.
Type of Examination:	Services:

	Completion of the exercisesCompletion of the programming tasksSuccessful presentation of the results in the exercises Written examination (also for certificate) Preliminary work as specified at the beginning of the semester
Media:	PowerPoint, blackboard
Literature:	Tom Mitchell. Machine Learning. McGraw-Hill, 1997. S. Russel and P. Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Englewood Cliffs, 2003

English courtesy translation.
The German version is legally binding

Module Name:	Masterarbeit
Engl. module name:	Master Thesis
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 3rd/4th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	University lecturer at FIN
Lecturer(s):	University lecturer at FIN
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV FIN: M.Sc. DIGIENG FIN: M.Sc. DKE FIN: M.Sc. INF FIN: M.Sc. INGINF FIN: M.Sc. VC FIN: M.Sc. WIF
Teaching Method / SWS:	Master's thesis, colloquium
Workload:	20 weeks Independent preparation of a scientific paper + colloquium
Credit points/ECTS:	30
Prerequisites according to examination regulations:	Proof of 120 CP from the specialisation areas
Recommended prerequisites:	
Intended learning outcomes:	The aim is to provide evidence that a scientific question from a field of computer science can be worked on under supervision using scientific methods and new findings can be obtained within a specified period of time. On successful completion of the module, students are also able to present and defend their own solutions to problems in a structured manner.
Contents:	The topic of the Master's thesis can be derived from current research projects at the institutes or from operational problems of a scientific nature. The assignment is always issued by a university lecturer from the Faculty of Computer Science. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialised discussion. In the colloquium, the topic of the Master's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.
Type of Examination:	Passed colloquium
Media:	
Literature:	

Module Name:	Mathematics M1e
Engl. module name:	Mathematics M1e

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The German version is legally binding

Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	V. Kaibel (FMA-IMO)
Lecturer(s):	V. Kaibel (FMA-IMO)
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Core subjects
Teaching Method / SWS:	Lecture; Exercise
Workload:	In class: Lecture Mathematics M1e -- 3 SWS / 42 h Global tutorial Mathematics M1e -- 2 SWS / 28 h Gruop tutorial Mathematics M1e -- 1 SWS / 14 h Self study: Preparation and follow-up of courses, exam preparation -- 66 h
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	none
Recommended prerequisites:	
Intended learning outcomes:	The students acquire comprehension of and familiarity with concepts and methods that are relevant to subject-specific classes in the areas of engineering and computer science. They develop technical skills by applying those methods, in particular to subject-specific examples. The topical focus of the module is on an introduction to linear algebra.
Contents:	- Complex numbers - Real and complex vectors - Matrices - Determinants - Linear maps - Eigenvalues (introduction) - Systems of linear equations
Type of Examination:	preliminary examination work: Announcement at the beginning of the semester exam: Written exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Mathematik III (Stochastik, Statistik, Numerik, Differentialgleichungen)
Engl. module name:	Mathematik III (Stochastik, Statistik, Numerik, Differentialgleichungen)
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Geometry
Lecturer(s):	Professorship for Geometry
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times 70h: SWS Lecture SWS Exercises Independent work 110h: Processing the weekly exercise sheets, exam preparation180h =70h attendance time + 110h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: Learning of typical stochastic and statistical concepts and development of skills and abilities, to work on practical tasks in stochastics and statistics Acquisition of the basic knowledge required for numerical mathematics, development of skills in solving numerical problems Acquisition of basic knowledge and skills for solving differential equations
Contents:	Stochastics: Discrete and continuous random variables and their distribution functions, limit theorems, modelling Statistics: descriptive statistics, confidence intervals and testing of hypotheses, statistical data analysis, regression, correlation and variance analysis Numerics: interpolation by polynomials, numerical integration, numerics of linear systems of equations, zeros of non-linear equations Differential equations: Fundamentals of n'th order ordinary differential equations: elementary explicit solution methods and initial value problems
Type of Examination:	Exam: Written (120 min)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Mathematik M1d
Engl. module name:	Mathematics M1d
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	V. Kaibel (FMA-IMO)
Lecturer(s):	V. Kaibel (FMA-IMO)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Core subjects FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Understanding
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time: Lecture Mathematics M1d -- 3 SWS / 42 h Global Exercise Mathematics M1d -- 2 SWS / 28 h Group exercise mathematics M1d -- 1 SWS / 14 h Self-study: Preparation and follow-up of courses, exam preparation -- 66 h
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	none
Recommended prerequisites:	
Intended learning outcomes:	Students gain understanding and familiarity with the mathematical concepts and methods relevant to specialised modules in engineering and computer science. You will acquire technical skills in dealing with these, in particular using subject-specific examples. The thematic focus of the module is an introduction to linear algebra.
Contents:	- Complex numbers - Real and complex vectors - Matrices - Determinants - Linear mappings - Eigenvalues (introduction) - Linear systems of equations
Type of Examination:	Examination prerequisite: Announcement at the beginning of the semester Exam: Written exam

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Mechatronische Aktoren und Sensoren
Engl. module name:	Mechatronic Actuators and Sensorees
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Kaspar, FMB-IMS
Lecturer(s):	Prof. Kaspar, FMB-IMS
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, independent work: Follow-up of the lecture, solving test tasks
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mechatronic Systems II
Intended learning outcomes:	Learning objectives and competences to be acquired Design and function of mechatronic actuators and sensors and their integration into mechatronic systems Application of mechatronic actuators and sensors, especially in the areas of vehicles and mobile systems
Contents:	Introduction of capacitive and inductive actuators and sensors Electrical control of capacitive and inductive actuators Calculation and control of capacitive and inductive actuator systems Evaluation circuits for capacitive and inductive sensors Integrated sensor-actuator systems Applications Position or force point valves, variable valve train, injection valves, mechatronic brakes, wedge brakes, mechatronic actuation and handling systems Vibration damping Chassis, bearings, engine mounts, structural vibrationsMagnetic bearings
Type of Examination:	Admission prerequisite: Participation in the exercises Exam: oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Mikrobiologie
Engl. module name:	Mikrobiologie
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. U. Reichl / Dr. H. Grammel / Dr. K. Bettenbrock
Lecturer(s):	Prof. Dr.-Ing. U. Reichl / Dr. H. Grammel / Dr. K. Bettenbrock
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching Method / SWS:	Lecture; practical course
Workload:	Attendance times: 2 SWS lecture / 2 SWS practical course Independent work: Reviewing the lecture Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28 h attendance time + 62 h independent work) Internship: 2 CP = 60 h (28h attendance time + 32h independent work)
Credit points/ECTS:	Lecture: 3 Internship: 2
Prerequisites according to examination regulations:	Passing the microbiology exam is a prerequisite for participation in the practical course
Recommended prerequisites:	
Intended learning outcomes:	Students acquire basic skills in the fundamentals of microbiology. The topics cover the structure and function of microorganisms, various metabolic processes in microorganisms and the basics of microbial genetics. They are trained to pay attention to the interdisciplinary connections to the fields of biology and biochemistry and thus to understand the subject area in an integrative manner. The internship serves to acquire skills in the use of microbiological working techniques.
Contents:	Introduction to microorganisms Classification of microorganisms Structure and function of the prokaryotic cell Growth, reproduction and spore formation Basic mechanisms of metabolism Bioenergetics Basics of genetics
Type of Examination:	Lecture: Written exam 90 min. Internship certificate
Media:	
Literature:	Will be announced in the lecture

Module Name:	Mobilkommunikation

English courtesy translation.
The German version is legally binding

Engl. module name:	Mobile Communication
Abbreviation:	MobCom
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	irregular
Module Coordinator(s):	Professorship for Computer Engineering
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time = 56 h - 2 SWS Lecture - 2 SWS Exercise Independent work = 124 h - Processing of exercises and programming tasks & exam preparation
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Computer Networks Network Programming for IoT Seminar: Hot Topics in Communication Systems
Intended learning outcomes:	Learning objectives & acquired competences: - Students are able to understand the differences between classic fixed networks and mobile wireless networks and their effects on all protocol layers. - Comprehensive overview of the requirements and principles of mobile communication - Ability to analyse and classify the basic design alternatives and their inherent trade-offs
Contents:	

	- Technical basics - Media access procedure - Media access protocols (wired/wireless) - Wireless LANs (technologies, standards, areas of application) - Security issues - Network protocols (mobile IP, ad-hoc networks, wireless sensor networks, routing) - Transport protocols (TCP variants and mobile TCP)
Type of Examination:	Successful completion of the exercises and programming tasks Exam: oral
Media:	
Literature:	Jochen Schiller, Mobile Communication, Addison-Wesley, 2nd edition, 2003

English courtesy translation.
The German version is legally binding

Module Name:	Modellierung
Engl. module name:	Modelling
Abbreviation:	Mod
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Klaus Turowski
Lecturer(s):	Prof. Dr. Klaus Turowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Compulsory subjects FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - Design
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 28 SWS Lecture28 SWS Exercise Independent work: 54 h Preparation and follow-up lecture 40 h Development of models for the exercise
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Creation of the methodological basis for the realisation of real-world problems in complex software systems Creating a basic understanding of modelling Learning techniques for process and data modelling at a functional conceptual level Gain practical experience in model-driven system development
Contents:	Modelling theory: From the world of discourse to formalised information models Processes, workflows and business processes Meta-models, reference modelling Principles of proper modelling XML basics Specialist conceptual modelling with higher Petri nets, the entity relationship method and BPMN Object-oriented modelling with UML Realisation of specific tasks
Type of Examination:	Written exam, 120 min. Appearance

	Preliminary work as specified at the beginning of the semester
Media:	
Literature:	Kecher, C. (2011): UML 2 – Das umfassende Handbuch. 4. Aufl. Reisig, W. (1998): Systementwurf mit Netzen. Berlin u. a.

English courtesy translation.
The German version is legally binding

Module Name:	Molekulare Zellbiologie
Engl. module name:	Molekulare Zellbiologie
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	FME, Prof. Dr. M. Naumann
Lecturer(s):	FME, Prof. Dr. M. Naumann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching Method / SWS:	Lecture
Workload:	Attendance times: 2 SWS Lecture Independent work: Reviewing the lecture 90 h (28 h attendance time + 62 h independent work)
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Building on the knowledge gained in the "Cell Biology" module, students acquire the Ability to transfer the most important processes and principles to the molecular level.
Contents:	Introduction to cell biology Cell organisation and organelles Membranes and membrane organisation Cell transport Cell communication
Type of Examination:	Written exam 2 hrs.
Media:	
Literature:	Will be announced in the lecture

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The German version is legally binding

Module Name:	Music Information Retrieval
Engl. module name:	Music Information Retrieval
Abbreviation:	MIR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Sebastian Stober
Lecturer(s):	Prof. Dr. Sebastian Stober
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Independent work = 94 hours: Preparation and follow-up of lectures and exercises, Working on exercises and programming tasks, course project
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	-
Contents:	- Music Representations - Fourier Analysis of Signals - Music Synchronisation - Music Structure Analysis - Chord Recognition - Tempo and beat tracking - Content-Based Audio Retrieval - Musically Informed Audio Decomposition
Type of Examination:	Examination in oral form: Announcement of the necessary preliminary work in the first week of the course and on the lecture website; Schein (oral): Announcement of the necessary preliminary work in the first week of the course and on the lecture website

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The German version is legally binding

Media:	
Literature:	Meinard Müller Fundamentals of Music Processing - Audio, Analysis, Algorithms, Applications, Springer 2015 ISBN: 978-3-319-21944-8

English courtesy translation.
The German version is legally binding

Module Name:	Numerical Methods for Visual Computing
Engl. module name:	Numerical Methods for Visual Computing
Abbreviation:	NMVC
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory subjects FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	In class teaching: - 2 SWS lecture / 2 SWS tutorial Self-study: - Self-study of lecture material / solution of exercises and assignments
Credit points/ECTS:	6 credit points = 180h (56h in class + 124h self-study), grading scheme according to exam regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The course provides an introduction to common numerical methods for visual computing, such as numerical linear algebra, time integration schemes for ordinary differential equations, numerical solution of partial differential equations, basis representations for functions, and tensor analysis. It also covers the requisite mathematics.
Contents:	Numerical linear algebra (e.g. (iterative) solution of linear systems, eigen and singular value decomposition)Basis representations ((Fast) Fourier transform, finite elements, polynomial bases; interpolation and quadrature)Numerical solution of ODEsNumerical solution of PDEsVector calculus and tensor analysis
Type of Examination:	Oral exam
Media:	

	Board, slides
Literature:	G. Strang. Linear Algebra and Its Applications. Thomson, Brooks/Cole, 2006.L. N. Trefethen. Approximation Theory and Approximation Practice. Society for Industrial and Applied Mathematics, 2012.V. I. Arnold. Ordinary Differential Equations. Springer-Textbook. Springer, third ed. edition, 1992.J. Kirkwood. Mathematical physics with partial differential equations. 2018.(Additional relevant literature will be announced in class)

English courtesy translation.
The German version is legally binding

Module Name:	Optimal Control
Engl. module name:	Optimal Control
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT)
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving exercises and exam preparation, project work 3 SWS = 150h (42h attendance time +108h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	Regelungstechnik
Intended learning outcomes:	Learning objectives and acquired competences: The module provides an introduction to the formulation, theory, solution and application of optimal control theory/dynamic optimization. The students are enabled to formulate and solve optimal control problems appearing in many applications spanning from medicine, process control up to systems biology. Besides the theoretical basis numerical solution approaches for optimal control problems are provided.
Contents:	Static optimisation Numerical algorithms Dynamic programming, principle of optimality, Hamilton-Jacobi-Bellmann equation Variational calculus Pontryagin maximum principle Numerical solution of optimal control problems Infinite and finite horizon optimal control, LQ optimal control Model predictive control Game theory Application examples from various fields such as chemical engineering, economics, aeronautics, robotics, biomedicine and systems biology
Type of Examination:	Written exam 120 min
Media:	
Literature:	

Module Name:	Parallele Programmierung
Engl. module name:	Parallel Programming
Abbreviation:	PP

Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance: 2 SWS lecture + 2 SWS exercise (56h) Independent work: Working on the exercises, following up the lecture, preparing for the exam (94h)
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Practical knowledge of a programming language and the ability to create simple programmes Knowledge of the basic mechanisms of operating systems (e.g. computer engineering) Basic knowledge of computer architectures
Intended learning outcomes:	Participants learn how to create parallel programs using various programming approaches, how to execute them and how to optimise their execution. In addition, further concepts for parallelisation are taught and put into practice in the exercises.
Contents:	Parallel programming is becoming increasingly important, as even mobile phones and laptops today have several processor cores. Some supercomputers even have several million cores and have established themselves as a useful and now indispensable tool for many areas of science. The resulting analyses and simulations have made it possible to significantly increase scientific knowledge in many areas. However, optimising the use of these components is no easy task, which is why scientists are constantly faced with new challenges when developing efficient applications. A deeper understanding of the hardware and software environment and possible causes of errors is therefore essential for parallel programming.

	The fundamentals of parallel programming are taught in the lecture; the exercises serve the practical application and implementation of the acquired knowledge in the C programming language. The lecture looks at some of the most important topics: Hardware and software concepts (multi-core processors, processes/threads, NUMA etc.), different approaches to parallel programming (OpenMP, POSIX threads, MPI) as well as tools for performance analysis and debugging (scalability, deadlocks, race conditions etc.). In addition, reasons and solutions for performance problems are discussed and alternative approaches to parallel programming are presented. Examples and problems are illustrated using real scientific applications.
Type of Examination:	Written exam of 120 min. Preliminary examination results will be announced at the beginning of the semester.
Media:	
Literature:	High Performance Computing: Modern Systems and Practices (Thomas Sterling, Matthew Anderson and Maciej Brodowicz)

English courtesy translation.
The German version is legally binding

Module Name:	Praktikum
Engl. module name:	Internship
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 7th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Dean of Studies at FIN
Lecturer(s):	All FIN lecturers
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching Method / SWS:	Internship
Workload:	20 weeks Internship specific
Credit points/ECTS:	18
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	After successfully completing the internship, students will have gained an insight into the operational processes and organisation in industry and public institutions, as well as into the social structures of companies/organisations. They know typical tasks in research and development and/or in production and operation. Students can work on and successfully solve a technical problem in an operational environment under supervision. You have knowledge of practical methods of algorithm, software and user interface development and/or the use of modern technologies in information and communication technology. Communication technology.
Contents:	Internship-specific in relation to the degree programme
Type of Examination:	Internship report
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Praktikum IT Sicherheit
Engl. module name:	Praktikum IT Sicherheit
Abbreviation:	P-ITSEC
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship of Applied Computer Science / Multimedia and Security
Lecturer(s):	Professorship of Applied Computer Science / Multimedia and Security
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Internship
Workload:	Attendance times: 28 h Project discussion, submission and acceptance Independent work: 132 h Development of a software solution 20 h Preparation and realisation of a presentation and submission of the results of the software internship (28 h attendance time + 152 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: The student should acquire additional practical skills in IT security in the specialisation Security and Cryptology as part of an internship (software development project). He/she should independently work on and solve a current and challenging topic within an associated task and present it orally and document it in writing.
Contents:	Internship as a software development project: Working on a selected current topic and solving a challenging development task in the field of IT security, such as from: System, network and application security Cryptology and protocols Media security and biometric systems Specification and formal verification of secure systems IT security management
Type of Examination:	Scientific project, includes presentation, submission and acceptance of the software development project
Media:	

Literature:	see www.iti.cs.uni-magdeburg.de/iti_amsl/lehre/

English courtesy translation.
The German version is legally binding

Module Name:	Principles and Practices of Scientific Work and Soft Skills
Engl. module name:	Principles and Practices of Scientific Work and Soft Skills
Abbreviation:	PPSW
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Coordinator International Relations and Exchange
Lecturer(s):	Dr. Claudia Krull
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. VC - Key and methodological competences
Teaching Method / SWS:	Lecture; Exercise; Project
Workload:	150 hours (40h contact hours + 110 independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Students have understood and practiced the skills necessary for scientific work and writing scientific publications, such as a Master's thesis. Students have learned soft skills and corresponding techniques, helpful for mastering their studies and also their professional and private life, such as setting goals, time management and working in teams.
Contents:	The course covers the following topics, among others: Introduction to Scientific Work Literature Research and Management Research Projects and Thesis Topics Scientific Writing - Thesis Structure and Writing Techniques Study Skills & Self Management Project Management & Team Work Presentation Skills The project and term paper topic can be related to an ongoing research project or be used for Master's thesis preparation.
Type of Examination:	Examination prerequisite Term paper
Media:	
Literature:	

Module Name:	Prozessmanagement
Engl. module name:	Prozessmanagement
Abbreviation:	

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The German version is legally binding

Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: SWS lecture = 28h, 2 SWS exercise = 28h Independent work: Lecture preparation and follow-up Development of solutions in the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Knowledge of methods and tools in the field of management information systems (e.g. through the course: Introduction to Management Information Systems)
Intended learning outcomes:	Learning objectives & competences to be acquired: Understanding how processes influence the aspects of customer orientation, productivity and value of an organisation Application of a methodical approach to the analysis and optimisation of processes Application of a methodical approach to measuring process performance Application of a methodical approach to the introduction of process management in organisations
Contents:	Basics of process management Procedure concept for the introduction of process management Methods for process identification and process implementation Process controlling Methods for process improvement and process renewal Customer Relationship Management Supply Chain Management Product Lifecycle Management

Type of Examination:	Examination prerequisite: Successful completion of the semester assignment enables students to take part in the oral examination Examination: oral examination
Media:	
Literature:	Seehttp://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module Name:	Qualitätsmanagementsysteme (FIN)
Engl. module name:	Qualitätsmanagementsysteme (FIN)
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture = 28h 2 SWS exercise = 28h Independent work: Lecture preparation and follow-up Development of solutions in the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points/ECTS:	6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Knowledge of methods and tools in the field of management information systems (e.g. through the course: Introduction to Management Information Systems)
Intended learning outcomes:	Learning objectives & competences to be acquired: Understanding the conflicting priorities of quality, costs and time Application of a methodical approach to the introduction of quality management in organisationsUnderstanding the legal consequences of poor qualityApplication of methodical approaches to measuring the tension between quality, costs and time Application of process-oriented quality management
Contents:	Basics of quality management Procedure concept for the introduction of a quality management system Legal aspects of quality management Deming's management programme Methods, tools and initiatives for quality management
Type of Examination:	Examination prerequisite: Successful completion of the semester assignment enables students to take part in the oral examination Exam: oral exam

English courtesy translation.
The German version is legally binding

Media:	
Literature:	Seehttp://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module Name:	Regelungstechnik
Engl. module name:	Control systems
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship of Systems Theory and Control Engineering
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Electrical Engineering
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 1 SWS Exercise Independent work: Solving the exercises (preparatory before the exercise) 90h = 3 SWS = 42h attendance time + 48h independent work
Credit points/ECTS:	§
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematik I-III, Signale und Systeme
Intended learning outcomes:	Learning objectives and competences to be acquired: Acquisition of basic knowledge and a basic understanding of the tasks and concepts of control engineering Development of the ability to formally describe and analyse linear single-variable control systems in the time and frequency domain Development of the ability to synthesise linear single-variable control systems
Contents:	Introduction: Tasks and objectives of control engineering Mathematical modelling with the help of differential equations Behaviour of linear time-invariant systems (stability, transmission behaviour) Analysis in the frequency range Simple control methods and controller designs (PID, PI, loop-shaping)
Type of Examination:	Examination: written (120 min)
Media:	
Literature:	[1] Lunze, J.: Regelungstechnik 1, Springer, 2004 [2] Föllinger, O.: Regelungstechnik, Hüthig, 1994 [3] Dorf, R. C.: Bishop, R. H.: Modern Control Systems, Prentice Hall, 2004 [4] Horn, M.: Dourdoumas, N.: Regelungstechnik Pearson Studium, 2004

English courtesy translation.
The German version is legally binding

Module Name:	Schlüsselkompetenzen I&II
Engl. module name:	Soft Skills I&II
Abbreviation:	SchlüKo I & II
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Dr.Claudia Krull
Language:	---
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Core subjects FIN: B.Sc. BiBaINF - Key and methodological competences FIN: B.Sc. CV - Core subjects FIN: B.Sc. CV - Key and methodological competences FIN: B.Sc. INF - Core subjects FIN: B.Sc. INF - Key and methodological competences FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. INGINF - Key and methodological competences FIN: B.Sc. WIF - Key and methodological competences
Teaching Method / SWS:	Lecture
Workload:	Attendance times = 56 h Winter semester: 4 SWS lecture Independent work = 124 h Homework & exam preparation
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Basic knowledge and methodological knowledge: Programme structure and study techniques Communication and collaboration Effective and efficient life planning act according to a work plan Successful studying Find creative solutions Understand yourself and others better express yourself in speech and writing
Contents:	Study planning & successful studying Goals & goal-orientated action Time management & scheduling Think and act independently Values and ethical behaviour Teams and team spirit Entrepreneurial spirit & initiative

	Leading the discussion scientific reports and presentations Digital Rights Sustainability Language now German and English, alternating live and with videos in both languages
Type of Examination:	Graded: Written exam, 120 min
Media:	Lecture videos are available in German and English for all participants
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module Name:	Schlüsselkompetenzen I&II (dual)
Engl. module name:	Key Competencies I&II
Abbreviation:	SchlüKo I & II
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Dr. Claudia Krull
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. CV - Key and methodological competences FIN: B.Sc. INF - Core subjects FIN: B.Sc. INF - Key and methodological competences FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. INGINF - Key and methodological competences FIN: B.Sc. WIF - Key and methodological competences
Teaching Method / SWS:	Lecture
Workload:	Attendance times = 56 h Winter semester: 4 SWS lecture Independent work = 124 h Homework & exam preparation
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Basic knowledge and methodological knowledge: Programme structure and study techniques Communication and collaboration Effective and efficient life planning act according to a work plan Successful studying Find creative solutions Understand yourself and others better express themselves verbally and in writing
Contents:	Study planning & successful studying Goals & goal-orientated action Time management & scheduling Think and act independently Values and ethical behaviour Teams and team spirit

	Entrepreneurial spirit & initiative Leading the discussion scientific reports and presentations Digital Rights Sustainability Language now German and English, alternating live and with videos in both languages
Type of Examination:	Presentation in cooperation with the practice partner as preliminary work Graded: Written exam, 120 min
Media:	Lecture videos are available in German and English for all participants
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module Name:	Scientific Writing
Engl. module name:	Scientific Writing
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Claudia Krull
Lecturer(s):	Temitope Ibidunni Akinloye
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Key and methodological competences FIN: M.Sc. WIF - Key and methodological competences
Teaching Method / SWS:	Seminar
Workload:	2 SWS Seminar participation, independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge about scientific writing Capability to review scientific articles Usage of web-based submission and review systems
Contents:	Literature citation and paraphrasing Presentations Review scientific articles Argument formation Knowledge and application of academic writing styles Peer review assessment
Type of Examination:	Seminar paper (Paper + Reviews) Presentation
Media:	
Literature:	

Module Name:	Scrum-in-Practice
Engl. module name:	Scrum-in-Practice

English courtesy translation.
The German version is legally binding

Abbreviation:	SIP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 5th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IKS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological competences
Teaching Method / SWS:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 224h independent work on the internship project
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Software Engineering
Intended learning outcomes:	Knowledge of the Scrum project management method Practical application of agile software development methods Gain practical experience by carrying out a project and reflecting on self-management and project management
Contents:	This module teaches theoretical knowledge and practical skills in dealing with Scrum. The course consists of three parts. In an introductory part, the necessary concepts of the Scrum process model are presented in two lectures and the technologies required for successful project implementation are specified. In the main part of the course, a project is implemented using Scrum in a one-week block course. This takes place in project teams of 4-5 participants. During this phase, Scrum meetings are held twice a day with the supervisors. As a result, participants learn to develop in a targeted and efficient manner using this development model.

	The block course takes place in one week during the lecture-free period. Attendance is of course compulsory. In order to successfully complete the project work, each participant is expected to familiarise themselves thoroughly with the necessary technologies. At the end of the project week, the participants reflect on their experiences and summarise them. These results are then discussed in a joint closing event.
Type of Examination:	Examination: scientific project
Media:	
Literature:	

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The German version is legally binding

Module Name:	Selected Chapters of IT Security 1
Engl. module name:	Selected Chapters of IT Security 1
Abbreviation:	ITSEC 1
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological competences Key and methodological skills - Scientific team project
Teaching Method / SWS:	Research project (FOPJ)
Workload:	Seminar on selected technical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 2 SWS Attendance times and independent work see point "Credit points" All degree programmes except DKE;M: 3 credit points = 90h (28 h attendance time + 62 h independent work) DKE;M: 4 credit points = 120h (28 h attendance time + 92 h independent work)
Credit points/ECTS:	3 DKE: 4
Prerequisites according to examination regulations:	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired competences: In a seminar specialising in security and cryptology, the student should learn and experience supplementary and up-to-date knowledge on selected technical topics of IT security by example in order to be able to apply IT security strategies. In doing so, he/she should work independently on a limited, challenging topic in theory and practice and document it in writing.
Contents:	

	Current challenges and solutions in IT security for selected technical topics such as from: System, network and application security Cryptology Media securityBiometric systemsSpecification and formal verification of secure systems
Type of Examination:	Examination prerequisite / form: Presentation
Media:	
Literature:	Literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

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Module Name:	Selected Chapters of IT Security 2
Engl. module name:	Selected Chapters of IT Security 2
Abbreviation:	ITSEC 2
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological competences
Teaching Method / SWS:	Research project (FOPJ)
Workload:	Seminar on selected organisational, legal, social and ethical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 2 SWS Attendance times and independent work see point "Credit points" All degree programmes except DKE;M: 3 credit points = 90h (28 h attendance time + 62 h independent work) DKE;M: 4 credit points = 120h (28 h attendance time + 92 h independent work)
Credit points/ECTS:	3 DKE: 4
Prerequisites according to examination regulations:	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired competences: The student should acquire supplementary and up-to-date knowledge on selected organisational as well as legal, social and ethical topics in the focus area of security and cryptology within a seminar and acquire the ability to apply this knowledge. In doing so, he/she should independently work on a limited, challenging topic theoretically, analysing various alternative solutions and document this in writing.

Contents:	Current challenges and solutions in IT security for selected organisational, legal, social and ethical topics such as:Security management Standardisation, certification and evaluation Legal, ethical and social aspects of IT security Security in e-business Case studies on IT security
Type of Examination:	Examination prerequisite / form: Presentation
Media:	
Literature:	Literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

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The German version is legally binding

Module Name:	Selected Chapters of IT Security 3
Engl. module name:	Selected Chapters of IT Security 3
Abbreviation:	ITSEC 3
Notes:	
Subtitles (if applicable):	Seminar with integrated development/evaluation project or scientific team project
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological competences Key and methodological skills - Scientific team project
Teaching Method / SWS:	Research project (FOPJ)
Workload:	Seminar on selected technical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 4 SWS 6 credit points = 180h (28 h attendance time + 152 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired competences: In a seminar specialising in security and cryptology, the student should learn and experience supplementary and up-to-date knowledge on selected technical topics of IT security using examples in order to be able to apply IT security strategies. He/she is expected to work independently on a comprehensive, challenging topic, both theoretically and practically, and document it in writing.
Contents:	Current challenges and solutions in IT security for selected technical topics such as from: System, network and application security Cryptology

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The German version is legally binding

	Media securityBiometric systemsSpecification and formal verification of secure systems
Type of Examination:	Examination prerequisite / form: Presentation
Media:	
Literature:	Literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module Name:	Selected Chapters of IT Security 4
Engl. module name:	Selected Chapters of IT Security 4
Abbreviation:	ITSEC 4
Notes:	
Subtitles (if applicable):	Seminar with integrated development/evaluation project or scientific team project
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological competences Key and methodological skills - Scientific team project
Teaching Method / SWS:	Research project (FOPJ)
Workload:	Seminar on selected organisational, legal, social and ethical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 4 SWS 6 credit points = 180h (28 h attendance time + 152 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired competences: The student should acquire supplementary and up-to-date knowledge on selected organisational as well as legal, social and ethical topics in the focus area of security and cryptology within a seminar and acquire the ability to apply this knowledge. In doing so, he/she should work independently on a comprehensive, challenging topic in theory, analysing various alternative solutions and documenting this in writing.
Contents:	Current challenges and solutions in IT security for selected organisational, legal, social and ethical topics such as from: Security management

	Standardisation, certification and evaluationLegal, ethical and social aspects of IT securitySecurity in e-businessCase studies on IT security
Type of Examination:	Examination prerequisite / form: Presentation
Media:	
Literature:	Literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module Name:	Seminar Managementinformationssysteme
Engl. module name:	Seminar Management Information Systems
Abbreviation:	SemMIS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Exercise; Seminar
Workload:	Bachelor: Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Independent work = 94 h Working through the topic Preparation of a presentation Written elaboration of the topic Master: Attendance times = 56 h 2 SWS Seminar Independent work = 124 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points/ECTS:	Bachelor: 5 CP Master: 6 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	

Intended learning outcomes:	Learning objectives & acquired competences: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic
Contents:	Selected topics on management information systems
Type of Examination:	Examination prerequisite: - Examination: term paper (seminar paper)
Media:	
Literature:	Website: http://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module Name:	Seminar Predictive Maintenance
Engl. module name:	Seminar Predictive Maintenance
Abbreviation:	PM
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Myra Spiliopoulou, Benjamin Noack
Lecturer(s):	Myra Spiliopoulou, Benjamin Noack
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. BiBaINF - Key and methodological competences - Scientific seminar FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological competences - Scientific seminar FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological competences - Scientific seminar FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological competences - Scientific seminar FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives
Teaching Method / SWS:	Seminar
Workload:	Lecture Time: 2 Hours per Week: Seminar / Consultations Individual Work Time 130h: - Reading and Understanding of Provided Papers - Research of Additional Papers - Writing - Presentation Bachelor students will mainly focus on overview studies and concepts. Master studies will focus on methods and comparisons.
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Students should have knowledge of linear algebra and calculus and, ideally, some knowledge of signal processing and data analysis
Intended learning outcomes:	- Independently research complex topics - Write clear scientific articles

	- Present informative and understandable scientific talks
Contents:	In this seminar, the participants will learn about - challenges and methods for data acquisition in industrial processing - data analysis tool in predictive maintenance - process modelling, fault detection, and state prediction
Type of Examination:	- Presentation - Discussion - Scientific Article
Media:	Introductory lectures, consultations, student presentations
Literature:	Literature be announced in the seminar.

English courtesy translation.
The German version is legally binding

Module Name:	Software Engineering & IT-Projektmanagement
Engl. module name:	Software Engineering & IT Project Management
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Dr. Thomas Wilde
Lecturer(s):	Dr. Thomas Wilde
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Compulsory subjects FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching Method / SWS:	Lecture; Exercise
Workload:	Lecture 2 SWS = 28h attendance time Exercise 2 SWS = 28h attendance time 94h independent work --- total 150h
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	Introduction to computer science, Algorithms and data structures
Intended learning outcomes:	Software Engineering: After the course, participants will have knowledge of the entire software life cycle from specification to design, development, validation and maintenance. Participants will be familiar with various process models and understand the interplay of process activities within them. Basic knowledge of design guidelines and patterns can be reproduced. Practical examples are used to apply the acquired knowledge with the help of current tools and techniques. IT project management: Participants acquire knowledge of project management methods with reference to software development. The basic functions of agile methods can be named. Tools and methods for project management are applied.
Contents:	- Software engineering - what is it and what is it used for? - Process models: Waterfall Model, Incremental Model, Integration and Configuration

	- Process activities: specification, development, validation, evolution - Test & Debugging - Agile software development - Tools & Tools - Clean coding / code conventions - Practical examples
Type of Examination:	Examination prerequisite required, will be announced at the beginning of the semester; Exam: written exam, 120 minutes; Certificate: Completion of the exercises
Media:	
Literature:	Ian Sommerville - Software Engineering Gamma, Helm, Johnson, Vliessides - Design Patterns Robert Martin - Clean Code: A Handbook of Agile Software Craftsmanship Robert Martin - The clean Coder Robert Martin - Clean Architecture

English courtesy translation.
The German version is legally binding

Module Name:	Software Development for Industrial Robotics
Engl. module name:	Software Development for Industrial Robotics
Abbreviation:	SDIR
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IVS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Engineering FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Engineering FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 224h independent work on the internship project
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Understanding of problems in the robotics domainUnderstanding and applicability of the mathematical background Practical experience in the programming of industrial robots based on various tasks
Contents:	The use of industrial robots is increasing rapidly these days. In 2014, the expected number of industrial robots increased by 27% compared to the previous year. The main reason is their flexibility, especially their ability to perform a wide range of tasks. In the lecture "Software-Development for Industrial Robotics" an overview of this domain is given as well as the mathematical background. The latter deals in particular with the idea of forward and inverse kinematics, point-to-point movements, linear movements, trajectory planning, recognition of singularities, Denavit-Hartenberg convention, rotation and translation matrices. The final project deals with control using a collision-free path planner, KUKA youBot kinematics, numerical approaches to solving inverse kinematics, etc.

Type of Examination:	Examination: scientific project
Media:	
Literature:	

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The German version is legally binding

Module Name:	Softwareprojekt
Engl. module name:	Software Project
Abbreviation:	SWP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - Software project FIN: B.Sc. CV - Key and methodological competences - Software project FIN: B.Sc. INF - Key and methodological competences - Software project FIN: B.Sc. INGINF - Key and methodological competences - Software project FIN: B.Sc. WIF - Design
Teaching Method / SWS:	Project
Workload:	Attendance time = 0 h (course-specific) Independent work = 180 h Project work in teams
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	IT project management module
Intended learning outcomes:	Learning objectives & acquired competences: Teamwork (in particular assigning and accepting responsibility, leadership, delegation and agreement of tasks, agreement of cooperation criteria) Project work (in particular agreement on objectives, specifications and requirements, planning of milestones and work packages, project implementation, documentation and presentation of a project and its results) Creation of a software package in a team This module is implemented through various courses. Subject-specific teaching objectives are offer-specific.
Contents:	Realisation of a software development project in a team Application of the contents of the IT project management module This module is implemented through various courses. Specialised content is offer-specific.
Type of Examination:	Graded: Cumulative: realisation, documentation and acceptance of a software project Ungraded: Passing of the graded performances

	This module is implemented through different courses. Study/examination achievements are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	

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Module Name:	Softwareprojekt (dual)
Engl. module name:	Software Project (dual)
Abbreviation:	SWP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 4th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological competences - Software project FIN: B.Sc. INF - Key and methodological competences - Software project FIN: B.Sc. INGINF - Key and methodological competences - Software project FIN: B.Sc. WIF - Design
Teaching Method / SWS:	Project
Workload:	Attendance time = 0 h (course-specific) Independent work = 180 h Project work in teams
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	IT project management module
Intended learning outcomes:	Learning objectives & acquired competences: Teamwork (in particular assigning and accepting responsibility, leadership, delegation and agreement of tasks, agreement of cooperation criteria) Project work (in particular agreement on objectives, specifications and requirements, planning of milestones and work packages, project implementation, documentation and presentation of a project and its results) Creation of a software package in a team and in cooperation with the practice partner This module is implemented through various courses. Subject-specific teaching objectives are offer-specific
Contents:	Realisation of a software development project in a team Application of the contents of the IT project management module This module is implemented through various courses. Specialised content is offer-specific.
Type of Examination:	Graded: Cumulative: realisation, documentation and acceptance of a software project Ungraded: Passing of the graded prerequisites

	This module is implemented through different courses. Study/examination achievements are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	

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The German version is legally binding

Module Name:	Startup Engineering I
Engl. module name:	Startup Engineering I
Abbreviation:	SE-I
Notes:	
Subtitles (if applicable):	Basics and methods for a successful start-up
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Study profile - Web founder FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Study profile - Web founder FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching Method / SWS:	Lecture; Exercise
Workload:	150 hours (56 h attendance time + 94 h independent work)
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	The participants know and understand the success factors of start-ups, the management of a start-up according to the "lean" philosophy and the methods used and have applied them themselves using given examples.
Contents:	Lean Startup Plausibility check of the minimum business model Assessment of the market potential Problem-solution fit and product-market fit Customer Journey Map Validation of start-up hypotheses
Type of Examination:	Examination prerequisite Graded: Term paper Ungraded: Passing the term paper
Media:	
Literature:	Eric Ries: The Lean Startup Various internet sources (will be announced in the course)

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The German version is legally binding

Module Name:	Startup Engineering II - Develop an MVP
Engl. module name:	Startup Engineering II - Develop an MVP
Abbreviation:	SE-II
Notes:	
Subtitles (if applicable):	Develop a Minimum Viable Product
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Project
Workload:	180 hours (28 h attendance time + 152 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Programming skills Successful completion of an independent programming project
Intended learning outcomes:	Participants understand the role of hypothesis in the preparation phase of a startup and the validation of this through an MVP. Participants have experience in developing an MVP for a startup using a current technology.
Contents:	Specification, creation and testing of an MVP to test a hypothesis.
Type of Examination:	Examination prerequisite: will be announced at the beginning of the course: Term paper
Media:	Individual choice of participants
Literature:	Internet research. Indications are given.

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The German version is legally binding

Module Name:	Steuerungstechnik
Engl. module name:	Discrete control systems
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Automation Technology and Modelling
Lecturer(s):	Dr. Jürgen Ihlow
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Electrical Engineering
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 1 SWS Lecture 1 SWS Exercise Independent work: Solving the exercises (preparatory work before the exercise)60h = 2 SWS = 28h attendance time + 32h independent work
Credit points/ECTS:	2
Prerequisites according to examination regulations:	
Recommended prerequisites:	Mathematics, electrical engineering, physics
Intended learning outcomes:	Learning objectives and competences to be acquired: Introduction to the theory of discrete systems and the mathematical tools required for their treatment Teaching skills for the design and realisation of combinatorial and sequential control systems
Contents:	Introduction Control/ regulation, signals, combinatorial and sequential control Basics of BOOLE algebra One and two-digit BOOLE functions, representation of BOOLE functions, arithmetic laws, normal forms, derivation of BOOLE functions Minimisation procedure Prime implicant, minimal normal forms, Karnaugh's method, McCluskey's approximation method, Quine- McCluskey's method Design of combinatorial control systems Design steps, signal definitions, modelling in the form of a circuit assignment table, minimisation, structuring Realisation of combinatorial controls Contact circuits, contactless circuits Fundamentals of automata theory

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	Definition of automata, models of automata, types of automata, methods of state reduction Design of sequential controls Design steps, signal definition, modelling, state coding, state reduction Realisation of sequential controls Controls, free feedback, concentrated storage elements, storage types
Type of Examination:	Exam: written
Media:	
Literature:	Zander, H. J.: Logischer Entwurf binärer Systeme, Verlag Technik, Berlin 1989Leonhardt, E.: Grundlage der Digitaltechnik, Carl Hanser Verlag, Munich, 1984 Borgmeyer, J:: Grundlage der Digitaltechnik, Carl Hanser Verlag, Munich, 1997

English courtesy translation.
The German version is legally binding

Module Name:	Strömungsmechanik I
Engl. module name:	Strömungsmechanik I
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. habil. Dominique Thévenin
Lecturer(s):	Prof. Dr.-Ing. habil. Dominique Thévenin
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Process Engineering
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

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The German version is legally binding

Module Name:	Swarm Intelligence
Engl. module name:	Swarm Intelligence
Abbreviation:	SI
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Intelligent systems
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercises Independent work: Work on exercises and programming tasks 180 h = 56 h attendance time + 124 h independent work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Computer science (algorithms and data structures, machine learning)
Intended learning outcomes:	Application of swarm intelligence methods for problem solving (optimisation and distributed systems)Ability to develop swarm intelligence algorithms
Contents:	Introduction to swarm intelligence (modelling and definitions)Swarm intelligence in optimisation (modelling, ant colony optimisation, particle swarm optimisation, multi-criteria optimisation) Swarm intelligence in dynamic environments Swarm intelligence for grouping and sorting tasks Swarm robotics
Type of Examination:	To pass the examination or obtain a licence, the following requirements must be met: - Acquisition of the admission requirements for the exam

	- Passing the written exam, 120 min. The admission requirements can consist of various elements, e.g. solving and presenting exercises or passing an intermediate exam in the semester. The exact admission requirements will be announced at the beginning of the lecture, at the latest by the end of the third week of lectures, on the chair's website.
Media:	
Literature:	Eric Bonabeau, Marco Dorigo and Guy Theraulaz, Swarm In-telligence: From Natural to Artificial Systems, Oxford University Press, 1999Andries Engelbrecht, Fundamentals of Computational Swarm Intelligence, Wiley 2006 James Kennedy and Russel Eberhart, Swarm Intelligence, Morgan Kaufmann, 2001 Zbigniew Michalewicz and David Fogel, How to solve it: Modern Heuristics, Springer, 2001 Veysel Gazi, Stability Analysis of Swarms, The Ohio State University, 2002 Marco Dorigo and Thomas Stützle, Ant Colony Optimisation, The MIT Press, 2004 C. Solnon: Ant Colony Optimisation and Constraint Program-ming. Wiley 2010 Gerhard Weiss, Multiagent Systems: A modern approach to distributed artificial systems, The MIT Press, 2000 Christian Müller-Schloer, Hartmut Schmeck and Theo Ungerer, Organic Computing - A Paradigm Shift for Complex Systems, Springer, 2011

English courtesy translation.
The German version is legally binding

Module Name:	System-on-chip
Engl. module name:	System-on-chip
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. INGINF - Engineering Sciences
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, fortnightly tutorials 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 180 h (42 h attendance time + 138 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science
Intended learning outcomes:	Learning objectives and acquired competences: After successfully completing the module, students will have detailed knowledge of the structure of system-on-chips (SoCs) and their individual components. They will be able to make design decisions independently, weigh up design alternatives and evaluate existing designs with regard to their suitability for a given application scenario. Students are able to name current trends in the design and use of SoC and categorise them in the overall context. Through exercises, students are able to deepen their knowledge and skills in a research-orientated manner and apply and evaluate them in complex problems.
Contents:	Design of System-on-Chips (SoCs)Intellectual Property Core (IP-Core) based design Design Reuse ARM processors Communication networks Network-on-Chips (NoCs) Memory types and memory hierarchy 3D systems Clock domains

	Power management Testing and reliability Case studies
Type of Examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Technische Darstellungslehre
Engl. module name:	Engineering Design Graphics
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Mechanical Engineering: https://www.verwaltungshandbuch.ovgu.de/Modulhandb%C3%BCcher-media_id-12598.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Beyer; FMB - IMK
Lecturer(s):	Prof. Beyer; FMB - IMK Weitere Lehrende: Dr. Träger, Dr. Schabacker; FMB-IMK
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Technische Informatik I
Engl. module name:	Principles of Computer Hardware
Abbreviation:	TI-I
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 1st semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Lecturer(s):	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Compulsory subjects FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: SWS Lecture SWS Exercise Independent work: Processing of exercises and programming tasks & exam preparation 150h = 4 SWS = 56h attendance time + 94h independent work.
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Ability to understand and describe the basic structure of computers as a layered model of different levels of abstraction Expertise in designing digital logic level components independently, In-depth knowledge of the machine level of a digital computer. Understanding the principles of increasing performance through assembly line and parallel processing
Contents:	Combinatorial switching networksSequential switching networks Computer arithmetic Structure of a computer Command set and addressing Conveyor belt and parallel processing
Type of Examination:	Requirements: Completion of the exercises and programming tasks

	Exam: Written exam 120 min.
Media:	
Literature:	Will be announced in the VL

English courtesy translation.
The German version is legally binding

Module Name:	Technische Logistik
Engl. module name:	Technical Logistics
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Mechanical Engineering: https://www.verwaltungshandbuch.ovgu.de/Modulhandb%C3%BCcher-media_id-12598.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Zadek, FMB-ILM
Lecturer(s):	Prof. Zadek, FMB-ILM; Further Lecturers : K. Hempel; FMB-ILM
Language:	---
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module Name:	Technische Mechanik 2/3
Engl. module name:	Engineering Mechanics 2/3
Abbreviation:	
Notes:	Information on this module can be found in the module catalogue for Bachelor's degree programmes at the Faculty of Mechanical Engineering: https://www.verwaltungshandbuch.ovgu.de/Modulhandb%C3%BCcher-media_id-12598.html
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 3rd semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Juhre, FMB-IFME
Lecturer(s):	Prof. Juhre, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering
Teaching Method / SWS:	
Workload:	
Credit points/ECTS:	5 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of Examination:	
Media:	
Literature:	

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The German version is legally binding

Module Name:	Technische Mechanik I
Engl. module name:	Technische Mechanik I
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Jens Strackeljan, Prof. A. Bertram, FMB-IFME
Lecturer(s):	Prof. Jens Strackeljan, Prof. A. Bertram, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 3 SWS Exercise self. Work: Exercises; exam preparation 210 hours (84 hours attendance time + 126 hours of s. work)
Credit points/ECTS:	7
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: Teaching basic knowledge of methods of engineering mechanics Explanation of the methodological approach: solving problems of statics using basic principles of engineering mechanics Basic knowledge in the field of strength Consolidation of knowledge in exercises by modelling and calculating simple technical systems
Contents:	Fundamentals of statics: Planar and spatial force systems, internal loads on beam and bar structures, friction and adhesion, centre of gravity calculation Fundamentals of strength of materials: Assumptions, definition of deformations and stresses, Hooke's law, tension and compression, bending; stability problems
Type of Examination:	Exercise certificate; written exam 120 min
Media:	
Literature:	

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The German version is legally binding

Module Name:	Theorie elektrischer Leitungen
Engl. module name:	Theorie elektrischer Leitungen
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. M. Leone, FEIT-IGET
Lecturer(s):	Prof. Dr.-Ing. M. Leone, FEIT-IGET
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Specialisation
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise Independent work: Exercises, exam preparation 120 h (42 h attendance + 78 h independent work)
Credit points/ECTS:	4
Prerequisites according to examination regulations:	Fundamentals of Electrical Engineering I-III, Theoretical Electrical Engineering
Recommended prerequisites:	
Intended learning outcomes:	In-depth physical insight into equalisation and propagation processes on line connections with rapid temporal changes or high frequencies, if their expansion cannot be neglected with regard to the delay time or wavelength Knowledge of basic solutions and approximation models in special cases from the fields of power engineering, electronics/circuit technology and communication technology Mathematical description and analysis of dynamic processes on lines in the time and frequency domain with any line circuit: line equations in complex form, reflection factor, ripple, resistance transformation, Smith chart, four-pole equivalent circuits, chain conductors Multiple lines: Line differential equation system, parameter matrices, modal transformation.
Contents:	Introduction: Conducted electromagnetic waves and wave types, TEM waves on lines: Derivation of differential equations and differential equivalent circuit of double line, solution in time and frequency domain, lossless and lossy case, phase & group velocity. Non-stationary analysis in the time domain: simple equalisation processes, reflection and refraction, wave equivalent circuit diagrams, multiple reflection (wave timetable, Bergeron method, network (SPICE) model of the dual line, pulse behaviour in dispersive lines Stationary analysis in the frequency range: current and voltage along the lossy line, four-pole representation, impedance transformation.

	Multiple lines: Definition and differential equivalent circuit diagram, line equations and wave equation, modal (eigenwave) solution, line crosstalk
Type of Examination:	Oral examination
Media:	
Literature:	

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The German version is legally binding

Module Name:	Transaction Processing
Engl. module name:	Transaction Processing
Abbreviation:	TP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	
Semester:	M.Sc. from 1st semester
Duration:	
Frequency:	
Module Coordinator(s):	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Thomas Leich
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Databases" event
Intended learning outcomes:	Learning objectives & acquired competences: Basic understanding of the problems of transaction management Knowledge of theoretical principles Knowledge of algorithms and procedures for synchronisation Knowledge of algorithms and procedures for maintaining ACID properties
Contents:	Transaction conceptSerialisability theory Synchronisation procedure Restoration and data backup Transaction management in distributed database systems (distributed synchronisation, distributed commit, etc.) Extended transaction models

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Type of Examination:	Examination requirements: Registration and participation in the lectures and exercises Examination/ certificate: oral
Media:	
Literature:	Databases: Implementation Techniques. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer, 3rd edition mitp-Verlag, Bonn, 2011, ISBN 978-3826691560

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Module Name:	Verfahrenstechnische Projektarbeit
Engl. module name:	Verfahrenstechnische Projektarbeit
Abbreviation:	
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	
Semester:	B.Sc. from 1st semester
Duration:	
Frequency:	
Module Coordinator(s):	Professorship for Thermodynamics and Combustion
Lecturer(s):	Dr. Hermann Woche, Prof. Dr. Eckehard Specht
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specialisations - Process Engineering
Teaching Method / SWS:	Internship; Seminar
Workload:	Attendance time: 28 hours, self-study: 32 hours
Credit points/ECTS:	2
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: Learning to work in groups and independently develop process engineering projects
Contents:	A possible process technology must be developed for the manufacture of a given product. The product behaviour must be investigated on a laboratory system.
Type of Examination:	Presentation
Media:	
Literature:	

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The German version is legally binding

Module Name:	Visual Analytics in Health Care
Engl. module name:	Visual Analytics in Health Care
Abbreviation:	VAHC
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Prof. Dr.-Ing. Bernhard Preim Dr. Gabriel Mistelbauer
Lecturer(s):	Prof. Dr.-Ing. Bernhard Preim Dr. Gabriel Mistelbauer
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Area Applications / Humanities Basics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory electives FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Seminar
Workload:	3 credit points = 90 h (28 h attendance time + 62 h independent work), grading scale according to examination regulations
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	Visualisation, Data Mining, Visual Analytics or Information Visualisation
Intended learning outcomes:	Learning objectives and competences to be acquired: This seminar teaches how combinations of data analysis (clustering, regression analysis, classification rules) can be combined with methods of interactive visualization, e.g. heat maps, scatterplots and time-based visualizations to solve problems in healthcare. The applications concern clinical medicine (decision support for physicians based on electronic health records), medical research, e.g. the recognition of undesirable drug effects, the area of public health, which is concerned, for example, with defining an adequate data-based reaction to a strong outbreak of an infectious disease, and epidemiology, which examines risk factors for the development of diseases on the basis of observation and cohort studies and thus develops approaches for the prevention of diseases. All the topics covered are based on real data. The presentations are also intended to raise awareness of the fact that data quality is never perfect; missing and partially unreliable or at least inaccurate data are the basis of the analytical evaluation.
Contents:	- Overview: Potential and applications of Visual Analytics in Healthcare - Visual Analytics in Public Health - Visual Analytics in Clinical Medicine - Visual Analytics for Detecting Adverse Drug Effects

	- Visual Analytics in Epidemiology
Type of Examination:	Examinations: student talk, seminar paper (10 pages)
Media:	PowerPoint presentation, use of whiteboard, videos
Literature:	Workshop volumes of the IEEE Workshop Visual Analytics in Healthcare (since 2010), selected publications of other conferences / magazines in the fields of data analysis and visualisation

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The German version is legally binding

Module Name:	Visualisation
Engl. module name:	Visualisation
Abbreviation:	VIS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor), Level 7 (Master)
Semester:	B.Sc. from 4th semester; M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Applied Computer Science / Visualisation
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. VC - Visual Computing - Compulsory subjects FIN: M.Sc. VC - Visual Computing - Compulsory electives
Teaching Method / SWS:	Lecture; Exercise
Workload:	Presence: - 2 SWS Lecture - 2 SWS Exercise Individual work: Work on the exercises and follow-up of the lectures, deepening the contents, exam preparation
Credit points/ECTS:	Bachelor: 5 credit points = 150h = 4 SWS = 56h attendance time + 94h independent work Master: 6 Credit Points = 180h = 4 SWS = 56h attendance time + 124h independent work Grading scheme according to exam regulations
Prerequisites according to examination regulations:	none
Recommended prerequisites:	Knowledge from the modules: Computer Graphics I, Mathematics I, II, III
Intended learning outcomes:	Goals (Bachelor and Master): This lecture conveys basic knowledge about visualising large data in a structured manner including interactive exploration of the data by means of visual interfaces. Objectives: - Awareness of visualisation goals, selection and assessment of visualisation techniques

	- Application of basic principles of computer-assisted visualisation - Adaptation of visualisation algorithms for solving application problems - Evaluation of visualisation techniques in terms of performance, scaleability additionally for Master: - Acquisition of basic knowledge of the most important computer graphics algorithms - Ability to use graphical approaches for various computer science applications
Contents:	Visualization goals and quality criteriaUnderstanding of fundamentals of visual perceptionOverview about data structures in visualizationBasic algorithms (Isolines, color scales, diagramm techniques),Direct and indirecte visualization of volume dataInformation visualization
Type of Examination:	Prerequisites: see lecture Exam: written examination 120 min.
Media:	Powerpoint presentation, sketches, videos
Literature:	P. and M. Keller (1994): Visual Cues, IEEE Computer Society PressT. Munzner (2015). Visualization Analysis and Design: Principles, Techniques, and Practice, A K PetersW. Schroeder, K. Martin, B. Lorensen (2001): The Visualization Toolkit: An object-oriented approach to 3d graphics, 3. Aufl. Springer, HeidelbergA. Telea (2014): Data Visualization: Principles and Practice, Second Edition, AK Peters (2. Auflage)M. Ward, D. Keim, G. Grinstein (2015): Interactive Data Visualization: Foundations, Techniques, and Applications, Second Edition

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The German version is legally binding

Module Name:	VLBA - Cloud DevOps Technologies
Engl. module name:	VLBA - Cloud DevOps Technologies
Abbreviation:	VLBA-CDOT
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	
Semester:	M.Sc. from 1st semester
Duration:	
Frequency:	
Module Coordinator(s):	Prof. Dr. Klaus Turowski
Lecturer(s):	Prof. Dr. Klaus Turowski
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance time = 42 h: - 21 h Lecture - 21 h Exercise Independent work = 138 h: - 138 h Processing of several consecutive assignments
Credit points/ECTS:	6 credit points = 6*30 h = 180 h (42 h attendance time + 138 h independent work) Grading scale according to examination regulations
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Creating an overview of relevant tools and technologies for the development of cloud-based systems and providing initial experience in their use.
Contents:	In view of highly networked applications, big data and cloud computing, the careful planning and construction of architectures and landscapes of the corresponding information systems is more important than ever. In many cases, the lifecycle of a system does not end with the delivery of the solution, but rather the subsequent operation, monitoring and maintenance have become an essential part of this process. At this point, sophisticated paradigms and methods are required to facilitate the continuous development and operation of these systems while preventing errors, failures and other disruptions. The course is designed to teach the basics as well as initial practical experience in the development and operation (DevOps) of systems in conjunction with dedicated cloud technologies. In addition to the

	theoretical basics, essential concepts and technologies that enable the continuous integration, delivery and testing of corresponding systems are discussed and applied.
Type of Examination:	Term paper
Media:	
Literature:	

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Module Name:	VLBA 1: Systemarchitekturen
Engl. module name:	VLBA 1: Systemarchitekturen
Abbreviation:	VLBA1
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Professorship for Applied Computer Science / Business Informatics
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Specialisation FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 28 h lecture / 28 h exercise Independent work: 54 h Preparation and follow-up lecture 70 h Development of an information system in the exercise 6 x30h (56 h attendance time + 124 h independent work)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & competences to be acquired: Learning techniques and methods of component-based system development Methods for building complex inter-organisational business information systems based on service-oriented architecture Acquisition of practical skills for the development of complex distributed information systems
Contents:	Theory of component-based system developmentSpecialist components, frameworks, component lifecycles,CoBCoM architectureArchitectures of system landscapes Pattern languages and architecture patterns Service-orientated architecture (SoA) Web services Mediators Case studies Personal Information GuideShared ERP Architecture

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	S4/Hana and SAP Datasphere Prototypical realisation of an inter-organisational information system based on the CoBCoM architecture and SoA
Type of Examination:	Report
Media:	
Literature:	Turowski, K.: Fachkomponenten. Aachen 2002. Herden, S., Marx Gómez, J., Rautenstrauch, C., Zwanziger, A.: Softwarearchitekturen für E-Business-Systeme, Berlin, Heidelberg u. a., 2006.

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Module Name:	Wahlpflichtfach FIN Schlüssel- und Methodenkompetenz
Engl. module name:	Elective Course in Method and Key Competencies
Abbreviation:	WPF FIN-SMK
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 6th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	Event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - FIN SMK FIN: B.Sc. CV - Key and methodological competences - FIN SMK FIN: B.Sc. INF - Key and methodological competences - FIN SMK FIN: B.Sc. INGINF - Key and methodological competences - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching Method / SWS:	Event-specific
Workload:	Event-specific
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences Advanced methodological skills in the field of computer science and its applications and/or advanced personal or social skills on the basis of a specialised course at OVGU. This module can be implemented through different courses. The subject-specific learning objectives are course-specific.
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of Examination:	This module is implemented through different courses. Study/examination achievements are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	Event-specific

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Module Name:	Werkzeuge für das wissenschaftliche Arbeiten
Engl. module name:	Tools for Scientific Work
Abbreviation:	WWA
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	
Semester:	B.Sc. from 1st semester
Duration:	
Frequency:	
Module Coordinator(s):	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological competences - Training module FIN: B.Sc. INF - Key and methodological competences - Training module FIN: B.Sc. INGINF - Key and methodological competences - Training module FIN: B.Sc. WIF - Key and methodological competences - Training module
Teaching Method / SWS:	Internship
Workload:	Attendance: 3 SWS (42h) Independent work: Follow-up of the presented contents, further work with the tools (48h)
Credit points/ECTS:	3 CP
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Participants learn how to use the tools presented and how to work effectively with them.
Contents:	Nowadays, a variety of tools are used for scientific work that can make scientists' work easier. However, it is necessary to know the strengths and weaknesses of the respective tools and to be familiar with how they work. In the training module, we will look at the most important tools for scientific work. These include using the command line, version management with Git, developing scripts for automation, plotting results and working with LaTeX for writing publications, reports and presentations. The course is designed to be very practical. The tools can and should be tried out live by the participants.
Type of Examination:	Active and successful participation in the attendance part
Media:	
Literature:	

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The German version is legally binding

Module Name:	Wissenschaftliches Individualprojekt
Engl. module name:	Wissenschaftliches Individualprojekt
Abbreviation:	WIP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Professorship for Simulation
Lecturer(s):	Offered by various university lecturers at FIN
Language:	German
Assignment to the curriculum:	for the Master's degree programmes
Teaching Method / SWS:	Guided scientific individual project
Workload:	180 hours of self-study and project work
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Offer-specific
Intended learning outcomes:	Learning objective: In this module, students acquire specialist knowledge in a sub-area of computer science through guided scientific work. This is done by studying specialised literature and through original scientific work. Acquired competences: Independent and guided scientific work, e.g: Familiarisation with a scienti. Presentation of the current state of knowledge on the basis of a literature researchRecognition of problems or gaps in knowledgeProposal for closing the gapImplementation of a proposed solutionPlanning, execution and interpretation of experimentsWriting a paperHolding a presentationThe subject-specific learning outcomes are offer-specific.
Contents:	Offer-specific
Type of Examination:	Scientific presentation and elaboration
Media:	
Literature:	Offer-specific

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Module Name:	Wissenschaftliches Seminar
Engl. module name:	Scientific Seminar
Abbreviation:	WissSem
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Key and methodological competences - Scientific seminar FIN: B.Sc. CV - Key and methodological competences - Scientific seminar FIN: B.Sc. INF - Key and methodological competences - Scientific seminar FIN: B.Sc. INGINF - Key and methodological competences - Scientific seminar FIN: B.Sc. WIF - Key and methodological competences - Scientific seminar
Teaching Method / SWS:	
Workload:	Attendance times = 28 h SWS Seminar Independent work = 62 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic This module is implemented through various courses. The subject-specific teaching objectives are course-specific.
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of Examination:	This module is implemented through different courses. Study/examination achievements are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	event-specific

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The German version is legally binding

Module Name:	Wissenschaftliches Seminar (dual)
Engl. module name:	Scientific Seminar (dual)
Abbreviation:	WissSem
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological competences - Scientific seminar FIN: B.Sc. INF - Key and methodological competences - Scientific seminar FIN: B.Sc. INGINF - Key and methodological competences - Scientific seminar FIN: B.Sc. WIF - Key and methodological competences - Scientific seminar
Teaching Method / SWS:	Lecture
Workload:	Attendance times = 28 h SWS Seminar Independent work = 62 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points/ECTS:	3
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic This module is implemented through various courses. The subject-specific teaching objectives are offer-specific
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of Examination:	This module is implemented through various courses. Study/examination achievements are course-specific and must be completed in cooperation with the practice partner. They will be announced at the beginning of the course.
Media:	
Literature:	event-specific

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Module Name:	Wissenschaftliches Team-Projekt
Engl. module name:	Wissenschaftliches Team-Projekt
Abbreviation:	WTP
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Lecturers at FIN
Lecturer(s):	Offered by various university lecturers at FIN.
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological competences FIN: M.Sc. DIGIENG FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Key and methodological competences FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. INGINF - Engineering Sciences FIN: M.Sc. INGINF - Key and methodological competences FIN: M.Sc. VC - Key and methodological competences FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems FIN: M.Sc. WIF - Business and Economics FIN: M.Sc. WIF - Key and methodological competences
Teaching Method / SWS:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 180h (distribution depending on the event)
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Advanced methodological skills in the field of computer science and its applications Advanced personal and social skills Working in a team Preparation and realisation of scientific presentations Independent and guided scientific work Implementation and evaluation of scientific ideas This module is implemented by different university lecturers. The subject-specific teaching objectives are therefore programme-specific

Contents:	This module is implemented by different university lecturers. The subject content is therefore specific to the programme.
Type of Examination:	event-specific
Media:	
Literature:	

Module Name:	Wissenschaftliches Teamprojekt KMD
Engl. module name:	Team project KMD
Abbreviation:	TeamprojKMD
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems Can be credited accordingly as an implementation of the generic module "Scientific Team Project".
Teaching Method / SWS:	Scientific team project
Workload:	Attendance times (incl. counselling appointments) and independent work (individually and in teams) according to "credit points" 180h = 28h attendance time +152h independent work Independent processing of a challenging scientific topic in group work Attendance time (incl. counselling appointments) for supervision and discussion of the topic, monitoring of progress in processing Team coordination Preparation of a presentation Preparation of the term paper, which also includes the contents of the presentation
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	Data Mining
Intended learning outcomes:	Learning objectives & acquired competences: 1. general objectives and competences: see module description of the faculty-wide module "Scientific Team Project" and 2 Subject-specific goals and competences:

	Acquisition of knowledge on selected topics of "Knowledge Management & Discovery" (examples of sub-areas under "Content") Familiarisation with a challenging scientific sub-area of "Knowledge Management & Discovery" Development of a solution to a real or realistic (simplified) task in the field of "Knowledge Management & Discovery"
Contents:	Advanced tasks from the research area "Knowledge Management & Discovery", including topics from the sub-areas: Stream Mining (Stream) Recommenders Medical Mining Opinion (stream) mining Active & semi-supervised (stream) learning
Type of Examination:	Examination: term paper
Media:	
Literature:	Subject-dependent, provided for each team at the beginning of the project

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Module Name:	Wissenschaftliches Teamprojekt Managementinformationssysteme
Engl. module name:	Scientific Team Project Management Information Systems
Abbreviation:	WTPMIS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 7 (Master)
Semester:	M.Sc. from 1st semester
Duration:	1 semester
Frequency:	every semester
Module Coordinator(s):	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching Method / SWS:	Exercise; Seminar
Workload:	Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Independent work = 124 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points/ECTS:	6
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired competences: Advanced methodological skills in the field of computer science and its applications Advanced personal and social skills Working in a team Preparation and realisation of scientific presentations Independent and guided scientific work Implementation and evaluation of scientific ideas
Contents:	Selected topics on management information systems
Type of Examination:	Examination prerequisite: - Examination: term paper (seminar paper)

Media:	
Literature:	Website: http://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module Name:	Wissensmanagement – Methoden und Werkzeuge
Engl. module name:	Knowledge Management - Methods and Tools
Abbreviation:	WMS
Notes:	
Subtitles (if applicable):	
Courses (if applicable):	
Module level according to DQR:	Level 6 (Bachelor)
Semester:	B.Sc. from 5th semester
Duration:	1 semester
Frequency:	Winter Semester
Module Coordinator(s):	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Design FIN: M.Sc. DKE - Applied Data Science
Teaching Method / SWS:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + 2 SWS tutorial Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 150 h = 4 SWS=56h attendance time+94h independent work Master's degree programmes: 6 CP -- achieved through an additional task announced in the exercise at the beginning of the semester
Credit points/ECTS:	5
Prerequisites according to examination regulations:	
Recommended prerequisites:	
Intended learning outcomes:	Gain insight into the field of knowledge management, including:Understanding the role of knowledge management and WMS in the organisationAcquiring knowledge of relevant technologies, with a focus on text miningAcquiring knowledge of the functionalities of knowledge management solutions using examples
Contents:	Knowledge management in the company: Terms and frameworks for knowledge management solutionsKnowledge and strategy/decision supportKnowledge management methods for explicit and tacit knowledge, including document management and text miningCase studies
Type of Examination:	Advance payments:

	Successful completion of the exercises Presentations of results Modalities will be announced at the beginning of the event. Examination: written (written exam)
Media:	
Literature:	Literatur zum Teil I der Lehrveranstaltung: 1. Franz Lehner 'WISSENSMANAGEMENT - Grundlagen, Methoden und technische Unterstützung' 6. überarbeitete und erweiterte Auflage, 2021, Verlag: HANSER; erreichbar unter www.hanser-elibrary.com von unserer Universitätsbibliothek 2. Fallstudien zusätzlich aus: • K. Mertins & H. Seidel. "Wissensmanagement im Mittelstand", SPRINGER (2009) • A. Stocker & K. Tochtermann, "Wissenstransfer mit Wikis und Weblogs: Fallstudien zum erfolgreichen Einsatzvon Web 2.0 in Unternehmen", GABLER (2010) Literatur zum Teil II der Lehrveranstaltung: 1. Einstiegshilfe für Klassifikation aus dem entsprechenden Kapitel des Buchs 'Introduction to Data Mining', 2. Auflage, (2018/2019) von Pan-Ning Tan, Michael Steinbach, Anuj Karpatne & Vipin Kumar, PEARSON (erreichbar unter https://www-users.cs.umn.edu/~kumar001/dmbook/index.php) 2. Auszüge zu Text Mining aus 'Modeling the Internet and the Web: Probabilistic Methods and Algorithms' (2003) von Pierre Baldi, Paolo Frasconi, Padhraic Smyth, WILEY 3. Tutorial von Jesse Read zu Multi-Label Klassifikation (verlinkt vom Foliensatz) 2013 Außerdem, zwei Einstiegsartikel zu Textklassifikation: 1) 'Text document preprocessing with the Bayes formula for classification using the Support Vector Machine' by Isa, D., Lee, L. H., Kallimani, V., and Rajkumar, R. IEEE Transactions on Knowledge and Data Engineering, 20(9):1264–1272, (2008), IEEE 2) 'Multinomial naive bayes for text categorization revisited' by Kibriya, A. M., Frank, E., Pfahringer, B., and Holmes, G. In Australasian Joint Conference on Artificial Intelligence, p. 488–499, (2004), SPRINGER Weiterführende Literatur zum Teil II: Wissensrohstoff Text: Eine Einführung in das Text Mining', Chris Biemann, Gerhard Heyer, Uwe Quasthoff (2022), SPRINGER Im Teil II gehen wir Themen ein, die im Buch in ✗ Abschnitt 3.2 'Die linguistische Pipeline': Unterabs. 3.2.1-4 ✗ Abschnitt 6.6 Klassifikation, insbesondere Naive Bayes & Evaluation ✗ Abschnitt 6.7 Erstellung von Trainingsdaten erscheinen. Weitere zitierte Literatur, zusätzliche Fallstudien und wissenschaftliche Artikel werden am Anfang des jeweiligen Veranstaltungsblocks bekannt gegeben.

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Module catalog

Part B

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for the study programs

Computer Visualistics (B.Sc. & M.Sc.),
Computer Science (B.Sc. & M.Sc.),
Engineering Informatics (B.Sc. & M.Sc.),
Business Informatics (B.Sc. & M.Sc.),
Digital Engineering (M.Sc.),
Data and Knowledge Engineering (M.Sc.)
and
Visual Computing (M.Sc.)

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at the
Otto von Guericke University Magdeburg
Faculty of Computer Science

Complete catalog

Table of Contents Part B

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Module title:	Adaptronik
Engl. module name:	Adaptronics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Michael Sinapius, IFME
Lecturer(s):	Prof. Dr. Michael Sinapius, IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: weekly 2 h (lecture) and practical course Independent processing of experiments, preparation of test protocols, presentation of results
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Principles of Adaptronics (BA program)
Intended learning outcomes:	Adaptronics creates a new class of technical, elastomechanical systems that can automatically adapt to a wide range of environmental conditions by using new activatable materials and fast digital controllers. Adaptronics has 4 target fields of technical applications: Contour adaptation through elastic deformation Vibration reduction through structure-borne sound interference Noise reduction through active measures Increased service life through structure-integrated component monitoring Students should learn and train interdisciplinary thinking in the engineering sciences based on the interdisciplinary research field of adaptronics, as is typical for the engineering profession. Adaptronics combines knowledge and skills in materials science, mechanical engineering, electrical engineering and control engineering. The exercises are carried out as laboratory exercises. In the practical course, students solve complex tasks independently, the successful completion of which is a prerequisite for admission to the examination.
Contents:	

	Overview of adaptronics, applications from research Structure-integrated sensors and actuators Structure-compliant integration of actuators and sensors Contour adjustment target field: Morphing methods. Vibration suppression target field: structure-borne sound interference, damping, compensation Target field of noise reduction: concepts of active noise reductionAutonomous systems - concepts of energy harvestingConcepts of integrated component monitoring Regulation Reliability / Robustness Accompanying practical laboratory course: Independent execution of experiments on adaptronics measurements, evaluation and presentation of the results
Type of examination:	Participation in the laboratory, oral examination
Media:	
Literature:	

Module title:	Advanced Database Models
Engl. module name:	Advanced Database Models
Module level, (optional):	
Abbreviation:	ADBM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester; M.Sc. from 2nd semester; M.Sc. from 3rd/4th semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Dr. Eike Schallehn
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	180h (56 h contact hours + 124 h self-study)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Database introduction course
Intended learning outcomes:	Comprehension of different non-relational database models, their basic concepts, and their historical development Comprehension of implications of non-relational data mod-els for query processing and application development Competence to use non-relational DBMS and based on their specific capabilities Competence to develop databases and according applica-tions using non-relational databases
Contents:	Overview and history of database models NF2-, object-oriented, object-relational, and semi-structured database models Application of the database models and design methodologies (extended ERM, UML, ODMG, XML Schema, etc.) Foundations of query languages (OQL, SQL:2003, XPath/XQuery, etc.) and query processing for non-relational data models

Type of examination:	Examination requirements: Participation and active involvement in the course and the exercises Final examination: written (120 minutes)
Media:	
Literature:	

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Module title:	Advanced Topics in Databases
Engl. module name:	Advanced Topics in Databases
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Dr. David Broneske
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Classes (2 hours per week) Exercises in the lab and project work (2 hours per week) Homework (124 h): Further Studies Realization of the exercises and the student projects Preparation for the final examination 180h (56h contact hours + 124h self-study)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge about database foundations and about principles of in-ternal database operations
Intended learning outcomes:	In the lecture students will be made familiar with most recent technological developments in data management. The first goal is to enable the attendees to use these new technologies in their professional careers in industry. Furthermore, the lecture focuses on aspects currently addressed in scientific research being on the verge to wide usage in current applications, and this way, enabling students to participate in academic and industrial research.
Contents:	

	Topics of the lecture will frequently change in accordance with cur-rent research directions in the database community and represent cutting-edge aspects as for instance Indexing and storage techniques for new applications and data types, Data management for embedded devices and sensor net-works, Self-management capabilities of database management sys-tems, etc.
Type of examination:	Exam requirements: Participation and active involvement in the course and the exercises Final examination: Oral
Media:	
Literature:	http://wwwiti.cs.uni-magdeburg.de/iti_db/lehre/advdb/

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Module title:	Advanced Topics in Geometric Mechanics
Engl. module name:	Advanced Topics in Geometric Mechanics
Module level, (optional):	
Abbreviation:	GeomechAdvanced
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Junior Professor Dr. Christian Lessig
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	3 credit points = 90 h (28 h attendance time + 62 h independent work) thesis), grading scale according to examination regulations
Credit points / ECTS:	3 CP
Mandatory prerequisites :	-
Recommended prerequisites:	Strongly recommended: Scientific Computing IV and V (Lagrangian and Hamiltonian geometric mechanics and reduction for systems on Lie groups)
Intended learning outcomes:	In the seminar we will discuss recent papers from the literature on discrete geometric mechanics and the necessary background from the continuous theory. A particular emphasis will be on fluids and their structure preserving discretizations, with applications to computer graphics and weather and climate simulations.
Contents:	Understanding of structure preserving discretizations of fluids and the trade-offs involvedAdvanced concepts from geometric mechanics (e.g. momentum maps, cotangent lift as a Poisson algebra homomorphism)
Type of examination:	Oral Exam
Media:	Blackboard, slides, sample programs

Literature:	J. E. Marsden and T. S. Ratiu. Introduction to Mechanics and Symmetry: A Basic Exposition of Classical Mechanical Systems. Texts in Applied Mathematics. Springer-Verlag, New York, third ed. edition, 1999.J. E. Marsden and M. West. Discrete Mechanics and Variational Integrators. Acta Numerica, 10:357-515, 2001.D. D. Holm, T. Schmah, and C. Stoica. Geometric Mechanics and Symmetry: From Finite to Infinite Dimensions. Oxford texts in applied and engineering mathematics. Oxford University Press, 2009.

English courtesy translation.
The German version is legally binding

Module title:	Advanced Topics in Machine Learning
Engl. module name:	Advanced Topics in Machine Learning
Module level, (optional):	
Abbreviation:	ATiML
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester; M.Sc. from 2nd semester; M.Sc. from 3rd/4th semester
Term:	Summer semester
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture: 2 SWS weekly exercise: 2 SWS Independent work: Completion of exercises and programming tasks; follow-up of the lecture 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basics of computer science, basics of machine learning, programming knowledge for the practical exercises advantageous
Intended learning outcomes:	Learning objectives & acquired skills: In-depth understanding of selected problems and concepts of machine learning methods Knowledge of advanced data structures and machine learning algorithms Ability to select and analyze complex machine learning algorithms depending on the problem

Contents:	Selected topics from the field of machine learning such as special learning methods (e.g. SVM) or special problems (e.g. massive data sets)
Type of examination:	Services: Processing the exercises Processing the programming tasks Successful presentation of the results in the exercises Exam: oral (also for certificate)
Media:	Powerpoint, blackboard
Literature:	

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Module title:	Advanced Topics in Networking
Engl. module name:	Advanced Topics in Networking
Module level, (optional):	
Abbreviation:	ATN
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. David Hausheer
Lecturer(s):	Prof. Dr. David Hausheer
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Lectures (2h per week) Theoretical and practical exercises (2 hours per week) Homework (124h): Further studies Implementation of the exercises Preparation for the final exam
Credit points / ECTS:	6 credit points = 180h (56h contact hours + 124h self-study) Grades according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	The lecture Computer Networks is recommended
Intended learning outcomes:	Students gain an in-depth insight into various advanced topics in the field of networks.
Contents:	The course covers advanced topics from the field of networks, including:Overlay networks for content delivery, e.g. P2P, BitTorrent, CDNs, caching, overlay video streamingDistributed Hash Tables (DHT), e.g. KademliaBlockchainsCryptocurrencies and BitcoinEthereum and Smart ContractsSecure network architectures, e.g. SCIONCongestion Control, e.g. QUIC and Multipath-QUIC
Type of examination:	Written examination
Media:	
Literature:	Textbooks according to announcement. Lecture slides and copies of articles as required.

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Module title:	Advanced Topics of KMD
Engl. module name:	Advanced Topics of KMD
Module level, (optional):	
Abbreviation:	AdvKMD
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Seminar
Workload:	Attendance times and independent work: Independent work on a challenging scientific topic Independent work in a small project, e.g. for the preparation and analysis of data on a given topic (optional, depending on the topic) Attendance time (incl. consultation appointments) for supervision and discussion of the topic, monitoring of progress during processing Preparation of a presentation Preparation of the term paper, which also includes the content of the presentation
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basics of data mining
Intended learning outcomes:	Learning objectives & acquired skills: Independent performance of the following tasks:

	Acquisition of knowledge on selected topics of "Knowledge Management & Discovery" (examples of sub-areas under "Content") Familiarization with a challenging scientific field Acquisition of relevant literature on the topic, comparison of literature content on the basis of specially derived comparison criteria Summary and critical appraisal of literature on the given topic, both in oral and written form
Contents:	Advanced topics in the research area "Knowledge Management & Discovery", including topics from the sub-areas: Stream Mining (Stream) Recommenders Medical Mining Opinion (stream) mining Active & semi-supervised (stream) learning
Type of examination:	Examination: Term paper
Media:	
Literature:	Scientific literature on each seminar topic; the acquisition of further relevant literature is part of the students' tasks during the seminar

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Module title:	Algorithm Engineering
Engl. module name:	Algorithm Engineering
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	
Workload:	Attendance times: 4 SWS Lecture Independent work: Follow-up of lectures, project 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired skills: The aim of algorithm engineering is to bridge the gap that often exists between the theory and practice of algorithm design by closely linking design, analysis, implementation and experimentation. Ability to apply the methods of algorithm engineering. Ability to design and carry out computer experiments to analyze algorithms
Contents:	Gap between theory and practice of algorithm design, experimental algorithms, realistic computer models, C++ software libraries, certifying algorithms, case studies.
Type of examination:	

	Examination prerequisite: Completion of the project (case study) Exam: oral
Media:	
Literature:	Müller-Hannemann, Schirra (eds): Algorithm Engineering, Springer LNCS 5971 C. McGeoch: Algorithm Engineering

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Module title:	Algorithmen und Datenstrukturen
Engl. module name:	Algorithms and Data Structures
Module level, (optional):	
Abbreviation:	AuD
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	FIN professors
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Design
Teaching method / weekly hours:	Lecture; Exercise; Tutorial
Workload:	Attendance times: - 4 SWS Lecture - 2 SWS Exercise - 1 SWS Tutorial 10 credit points = 300 h (64h + 28h + 14h = 106h attendance + 194h independent work) Independent work: - Solving exercises and exam preparation, programming competition
Credit points / ECTS:	10
Mandatory prerequisites :	none
Recommended prerequisites:	
Intended learning outcomes:	- Acquisition of basic knowledge of the concepts of computer science - Ability to solve algorithmic tasks and to design data structures - Familiarity with the informatics way of thinking when solving problems
Contents:	- Lists - Trees, Balanced search trees - Hash procedure - Graphs - Dynamic programming - Design of algorithms - Search in texts
Type of examination:	Exam: Written exam 120 min. Admission prerequisites: successful completion of the exercises (voting) and the programming competition
Media:	
Literature:	- Saake/Sattler: Algorithms and data structures

	- Goodrich/Tamassia: Data Structures and Algorithms in Java - Sedgewick: Algorithms

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Module title:	Allgemeine Elektrotechnik
Engl. module name:	Electrical engineering and electronics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Electrical Engineering / Electrical Actuators, Professorship of Power Electronics
Lecturer(s):	Prof. Dr.-Ing. Andreas Lindemann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 3SWS Independent work: 3SWS
Credit points / ECTS:	10
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I-II, Physics
Intended learning outcomes:	Learning objectives and skills to be acquired: Acquire the knowledge and skills required to understand electrical engineering contexts
Contents:	The course is aimed at students of non-electronic subjects and teaches application-related basic knowledge. The following topics are covered in lectures, exercises and laboratory practicals: Basic quantities of electrical engineering Calculation of direct current circuits Electric and magnetic field Alternating current technology Introduction to semiconductor technology and electronic circuits Basics of digital technology Design and operating principles of electrical machines Measurement of electrical quantities

Type of examination:	Exercise certificate, internship certificate, written exam
Media:	
Literature:	R. Busch: Electrical Engineering and Electronics, Teubner Vlg. 2003 U. Seidel, E. Wagner: General Electrical Engineering, Hanser Vlg. 1999

English courtesy translation.
The German version is legally binding

Module title:	Allgemeine Psychologie I
Engl. module name:	General Psychology I
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Stefan Pollmann
Lecturer(s):	Prof. Dr. Stefan Pollmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Psychology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing
Teaching method / weekly hours:	Lecture
Workload:	Attendance time: 2 SWS (28 hours), study time: 92 hours. Total: 120 hours 2CP per lecture (can also be credited individually)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Students learn about general psychological relationships in the areas of perception, action, cognition and language and their neuroscientific foundations. The course content should provide them with the knowledge and skills to understand further psychological issues in the basic and advanced modules. Based on these fundamentals, students should be able to apply the subject-specific skills they have acquired to applied issues.
Contents:	General Psychology I/1: Perception Action General Psychology I/2: Cognition Language
Type of examination:	Exams at the end of each semester.
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Allgemeine Psychologie II
Engl. module name:	General Psychology II
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Stefan Pollmann
Lecturer(s):	Prof. Dr. Stefan Pollmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Psychology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing possibly as General Psychology II/1 and II/2
Teaching method / weekly hours:	Lecture
Workload:	2 lectures, one hour each Attendance time: 2 SWS (28 hours), study time: 92 hours. Total: 120 hours 2CP per lecture (can also be credited individually)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	General Psychology I
Intended learning outcomes:	Students learn about general psychological relationships in the areas of learning, memory, motivation, emotion and volition and their neuroscientific foundations. The course content should provide them with the knowledge and skills to understand further psychological issues in the basic and advanced modules. Based on these fundamentals, students should be able to apply the subject-specific skills they have acquired to applied issues.
Contents:	General Psychology II/1: Learning Memory General Psychology II/2: Motivation Emotion Volition
Type of examination:	Exams at the end of each semester.

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Alternative Energien / Regenerative Elektroenergiequellen
Engl. module name:	Alternative Energien / Regenerative Elektroenergiequellen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	3 SWS = 150h (42h attendance time +108h independent work) Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Control engineering, control technology, discrete-event systems
Intended learning outcomes:	Learning objectives and acquired skills: The course imparts knowledge of energy generation from renewable energy sources. Students learn about the most important renewable energy sources: Solar energy, hydropower, wind power and biomass, and the possible uses of the regenerative energy potential available are demonstrated. Furthermore, knowledge of energy storage, fuel cells and the problems of grid integration of renewable energy systems and energy storage is imparted.
Contents:	Introduction, electrical energy systems, energy terms Basics of renewable energy supply, energy balance Photovoltaic power generation Electricity generation from wind power Electricity generation from hydropower Fuel cells Electrical energy storage Grid operation of local energy producers
Type of examination:	Oral examination

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Anatomie and Physiologie
Engl. module name:	Anatomy and Physiology
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Friedemann Awiszus (teaching import from the FME)
Lecturer(s):	Prof. Dr. Friedemann Awiszus (teaching import from the FME)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology
Teaching method / weekly hours:	Lecture
Workload:	2 SWS 150h (28h attendance time in the lecture 122h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The module focuses on the development of scientific principles in the theoretical fields of anatomy, physiology and sports and performance medicine. Students acquire basic knowledge of the structure and function of organ systems, taking into account the stress and strain of physical activity. Basic knowledge from the fields of biomechanics and functional anatomy as well as performance physiology is taught for the planned and controlled design of exercise, play and sport in the various fields of activity (recreational sport, competitive sport, health and rehabilitation sport and sport for people with disabilities).
Contents:	Biological basics and basics of the musculoskeletal system Descriptive and functional anatomy of the passive and active musculoskeletal system Anatomy and physiology, function and operation of the various organ systems (cardiovascular and respiratory system, blood and immune system, endocrine system, nervous system, urinary tract, digestive system, sensory organs) Basics of energy metabolism Neurophysiological basics of motor skills
Type of examination:	Written exam (90 minutes)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Angewandte Bildverarbeitung
Engl. module name:	Applied image processing
Module level, (optional):	
Abbreviation:	ABV
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Winter semester
Module coordinator:	Professorship of Neuro-Information Technology, Professorship of Computer Engineering
Lecturer(s):	apl. Prof. Dr.-Ing. habil. Ayoub Al-Hamadi
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology
Teaching method / weekly hours:	Internship; Seminar
Workload:	Attendance times: Summer semester: 2 SWS seminar Winter semester: 1 SWS seminar + 1 SWS software project Independent work: Project work (presentation preparation + software preparation)
Credit points / ECTS:	7 credit points = 210h (56h attendance time + 154h independent work) Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of image processing (FIN), signal-oriented image processing (FEIT)
Intended learning outcomes:	Learning objectives & skills to be acquired: Students should deepen and practically apply their knowledge in the field of applied image processing by means of given or possibly self-chosen special topics
Contents:	The course covers special topics, for example from current research in the field of image processing. These topics include image correction, 3D measurement, image sequence processing, facial analysis, information fusion, neural networks, biological and medical applications. In the first part, groups prepare a presentation on a specific topic, which is then given to the seminar participants. The second part is a practical software implementation of special image processing problems. This also serves to deepen programming skills.
Type of examination:	Oral exam: cumulative: lectures & 1 software solution

Media:	
Literature:	see script

Module title:	Anwendungssysteme
Engl. module name:	Business Application Systems
Module level, (optional):	
Abbreviation:	AWS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Prof. Dr. Klaus Turowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Apply BSc KWL, WPF WI 1.2, WI 2.1, WI 2.2
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 28h Lecture 28h Exercise Independent work: Preparation and follow-up of the lecture Processing case studies for the exercise Lecture 2 SWS = 28h attendance time + 62h independent work Exercise 2 SWS = 28h attendance time + 32h independent work -> 150 h
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Creating a basic understanding of functions and interrelationships in operational application systems along the value chain Practical experience with process-oriented information processing on a specific ERP system
Contents:	Basics of the value chain according to Porter Business information processingResearch and developmentSalesPurchasingProductionLogisticsCase studies on complex business processes with SAP R/3 Enterprise
Type of examination:	

	Case study work in the exercise Written exam, 120 min. Appearance Preliminary work as specified at the beginning of the semester
Media:	
Literature:	Mertens, P. (2005): Integrated Information Processing 1. 15th edition, Berlin et al.

English courtesy translation.
The German version is legally binding

Module title:	Applied Deep Learning
Engl. module name:	Applied Deep Learning
Module level, (optional):	
Abbreviation:	ADL
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Sebastian Stober
Lecturer(s):	Prof. Sebastian Stober
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	180h (40h contact hours + 140h self-study and practical application in project); contact hours: block lecture (1 week); self-study comprises additional reading; follow-up project in an application domain including a written report as well as kick-off and final presentation in a colloquium.
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	- linear algebra and probability theory - machine learning (e.g. "intelligent systems" or "machine learning")
Intended learning outcomes:	- confidently apply DL techniques to develop a solution for a given problem - follow recent DL publications and critically assess their contributions - formulate hypotheses and design & conduct DL experiments to validate them - document progress & design decisions for reproducibility and transparency
Contents:	- artificial neural network fundamentals (gradient descent & backpropagation, activation functions) - network architectures (convolutional neural networks, recurrent/recursive neural networks, auto-encoders) - regularization techniques - introspection & analysis techniques

	- optimization techniques - advanced training strategies (e.g. teacher-student)
Type of examination:	project report + kick-off and final presentations Ticket: same (need to pass)
Media:	
Literature:	Ian Goodfellow, Yoshua Bengio & Aaron Courville: "Deep Learning", MIT Press, 2016.

Module title:	Applied Discrete Modeling
Engl. module name:	Applied Discrete Modeling
Module level, (optional):	
Abbreviation:	ADM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Claudia Krull
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	180 hours (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics for engineers Programming skills
Intended learning outcomes:	Participants are familiar with Markov chains and selected applications and solution methods Participants are familiar with non-Markovian stochastic processes and can model and simulate them in different ways The participants know hidden Markovian and non-Markovian processes The participants know selected research topics of the chair Participants will be able to implement the models and methods they have learned and apply them to problems from the university's main research areas, particularly medicine and engineering
Contents:	Discrete-time and continuous-time Markov chains

	Applications and programming of calculation methods for Markov chains Method of additional variables Proxel simulation and phase distributions Modeling with hidden models Programming solution methods for different model classes Modeling and solving problems in medicine and engineering
Type of examination:	Examination performance Graded: Oral examination
Media:	
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module title:	Argumentationstheorie in der Künstlichen Intelligenz
Engl. module name:	Argumentation Theory in Artificial Intelligence
Module level, (optional):	
Abbreviation:	ArgTheo
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Theoretical Computer Science
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: Weekly lectures/seminars per semester: 4 SWS (2SWS per academic year) Independent work: Reading scientific texts, preparing presentations, preparing term papers 180h = 4SWS = 56h attendance time + 124h independent work, grading scale according to examination regulations
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Prior knowledge of logic (e.g. first-level predicate logic)
Intended learning outcomes:	Learning objectives & acquired skills: Familiarization with a demanding scientific field Acquisition of relevant literature on the topic, comparison of literature content on the basis of specially derived comparison criteria Summary and critical appraisal of literature on the given topic, both in oral and written form
Contents:	Argumentation theory is an interdisciplinary field with the aim of representing, analyzing and evaluating arguments. Argumentation theory considers many aspects of argumentation

	that are typically abstracted from in deductive symbolic logic (e.g. first-level predicate logic): Many claims cannot be proven, but there are arguments for and against (pros and cons). Argumentations may involve one, two or more agents, who may have varying degrees of competence or trustworthiness. These agents can put forward arguments that support or attack each other. Arguments are often supported non-deductively (for example with analogies). The coherence of the argument depends on the prior knowledge and interests of the audience. Knowledge representation languages that are based on deductive, symbolic logic are therefore generally not suitable for adequately representing reasoning in information systems. In the course, students will work together to develop how to adequately represent, analyze and evaluate arguments.
Type of examination:	Admission prerequisite: regular active participation in the seminars Examination: Term paper
Media:	
Literature:	I. Rahwan, G. R. Simari (eds): "Argumentation in Artificial Intelligence", Springer, 2009. P. Besnard , A. Hunter: "Elements of Argumentation", MIT Press, 2008

English courtesy translation.
The German version is legally binding

Module title:	Assistenzrobotik
Engl. module name:	Assistance robotics
Module level, (optional):	
Abbreviation:	AROB
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Hon. Prof. Dr. Norbert Elkmann, Fraunhofer IFF
Lecturer(s):	Hon. Prof. Dr. Norbert Elkmann, Fraunhofer IFF
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 14 lectures in the summer semester (weekly) 7 exercises (fortnightly) Independent processing of exercises/programming tasks on the computer 180h = 42h attendance time + 138h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	- Programming skills - Linear algebra as well as experience with Robot Operating System (ROS) and simulation environments
Intended learning outcomes:	Learning objectives & acquired skills: Basics of assistance robotics (mobile robots, industrial robots, sensor technology) Modeling of robot kinematics Requirements and solutions for human-robot collaboration (HRC) and human-robot interaction Knowledge of safety requirements, application of safety aspects in the design of HRCs Ability to apply software frameworks in robotics
Contents:	- Introduction to assistant robotics

	-Basics of assistance robotics (modeling of robot kinematics, path planning, motion and force control, sensors, mobile systems) -Human-robot collaboration and safety: technologies, machine safety, standards, legal situation -AI processes in robotics - Software frameworks and simulation -Programming project during the semester
Type of examination:	Regular participation in lectures and exercises Successful completion of the exercises and programming tasks Oral examination: 20 minutes
Media:	
Literature:	Will be announced in the VL

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The German version is legally binding

Module title:	Augmented & Virtual Reality
Engl. module name:	Augmented & Virtual Reality
Module level, (optional):	
Abbreviation:	AVR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Christian Hansen
Lecturer(s):	Prof. Dr. Christian Hansen
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. VC - Visual Computing - Compulsory subjects
Teaching method / weekly hours:	Lecture; Project
Workload:	Lecture + team project (4SWS) for Bachelor students: 150h (56h contact hours + 94h self-study) for Master students: 180h (56h contact ours + 124h self-study)
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP
Mandatory prerequisites :	n/a
Recommended prerequisites:	Introduction to Computer Graphics
Intended learning outcomes:	Following topics in the field of VR/AR are addressed: - Introduction to VR/AR systems - Perceptual aspects - Input devices - Output devices - AR components and types - Interaction techniques - Case studies
Contents:	Virtual Reality (VR) and Augmented Reality (AR) systems are a component of modern user interfaces in industry, entertainment and medicine. The design and implementation of such systems is part of many development and research projects. This module covers fundamentals and advanced techniques in the area of VR/AR systems. Students will gain the theoretical foundation needed to design, implement, improve, and evaluate VR/AR systems. In addition, the theoretical

	foundations can be applied in a team project that accompanies the lecture.
Type of examination:	Participation and active involvement in the course and the team project, successful completion of the admission tests and final examination Exam: oral
Media:	
Literature:	

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The German version is legally binding

Module title:	Ausgewählte Algorithmen der Computergraphik
Engl. module name:	Selected Algorithms in Computer Graphics
Module level, (optional):	
Abbreviation:	AACG
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship Visual Computing
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercise Independent work: Work on exercises and programming tasks 180 h = 56 h attendance time + 124 h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge of basic and advanced methods of geometry processing Ability for practical application
Contents:	Linear least-squares approximation Data interpolation and approximation Matrix factorization, sparse matrices Regularization General applications and case studies
Type of examination:	Regular participation in lectures and exercises

	Completion of the exercises is necessary to obtain admission to the examination Exam: oral
Media:	
Literature:	

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The German version is legally binding

Module title:	Ausgewählte Probleme in Human Factors
Engl. module name:	Selected Chapters in Human Factors
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Maria Luz / Jun.Prof. Dr. Christian Hansen
Lecturer(s):	Dr. Maria Luz
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Seminar
Workload:	Attendance times: - Weekly lectures 2 SWS Independent work: - Prepare/hold a lecture
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Sensitization for problems in the design of human-technology interaction, ability to evaluate new developments in human-technology interaction from a psychological perspective, to assess their risks and potentials based on psychological theories and paradigms, overview of psychological research methods
Contents:	Automation, trust in automation, attention restrictions, design of alarms and warnings, robots, autonomous driving, compatibility, AR/VR
Type of examination:	Examination prerequisite: see lecture Examination: presentation
Media:	
Literature:	

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The German version is legally binding

Module title:	Automated Reasoning
Engl. module name:	Automated Reasoning
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Winter semester
Module coordinator:	Chair of Theoretical Computer Science
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance time: 56 hours. Completion of exercises, reading of scientific texts, follow-up of the lecture, preparation for the exam = 94 hours.
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Successful completion of the "Logic" module
Intended learning outcomes:	Ability to understand scientific texts, to model complex problems in logical languages, to use theorem provers to solve problems, understanding of the function of theorem provers
Contents:	Course content: In this course we will look at how to model problems in a logical language and solve them with the help of an Automatic Theorem Prover (ATP). In addition, we will study the methods and algorithms used by modern ATPs (resolution, superposition, axiom selection). This will be done by reading relevant literature as well as tasks in which the participants put what they have learned into practice.
Type of examination:	Admission prerequisite: regular participation in the seminar, successful completion of the exercises Exam: oral
Media:	

Literature:	

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The German version is legally binding

Module title:	Automatisierungssysteme
Engl. module name:	Automatisierungssysteme
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Christian Weber (FEIT-IFAT) / Dr.-Ing. Peter Eichelbaum (FEIT-IFAT)
Lecturer(s):	Prof. Dr. Christian Diedrich
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation 3 SWS = 150h (42h attendance time +108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science
Intended learning outcomes:	Learning objectives and skills to be acquired Models and methods for handling automation systems Interaction and cooperation strategies of automation systems Integration technologies Principles of procedural and descriptive description methods for technical systems
Contents:	Modern information and knowledge-processing systems are used in automation technology. The proximity of automation to the dynamic processes of machines and production plants requires specific models and methods for their analysis, design and operation, which are presented in this module. Automation systems are made up of a large number of components that have to interact with each other. These components must therefore be integrated in terms of their information exchange. Technologies from both the IT/Internet and automation technology environments are available for this purpose. For this reason, the relationship between model,

	description language and tool is explained in principle and deepened for the implementation of control and regulation designs.
Type of examination:	Oral examination
Media:	
Literature:	

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Module title:	Automatisierungstechnik
Engl. module name:	Automatisierungstechnik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	
Module coordinator:	Dr.-Ing. J. Ihlow, FEIT-IFAT
Lecturer(s):	Dr.-Ing. J. Ihlow, FEIT-IFAT
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture: 2 SWS Exercise: 1 SWS (fortnightly) Independent work: Follow-up of the lecture Preparation and follow-up of the contents of the exercise, sample solutions available 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Teaching basic methods for the automation of discrete-event systems Ability to describe, model and implement control engineering problems Acquisition of knowledge of the technical programming implementation of control functions
Contents:	Fundamentals of automation of discrete-event systemsDiscrete events, signals and systems Design and realization of combinatorial control systems using Boolean algebra methods Automata models for the description and design of sequential control systems Petri nets as a method for designing and analyzing control systems Realization with programmable logic controllers
Type of examination:	Participation in lectures and exercises

	Written exam (90 min)
Media:	
Literature:	according to the lecture notes

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The German version is legally binding

Module title:	Bachelorarbeit
Engl. module name:	Bachelor Thesis
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 7th semester
Term:	
Module coordinator:	University lecturer at FIN
Lecturer(s):	-
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF FIN: B.Sc.
Teaching method / weekly hours:	Colloquium; Bachelor thesis
Workload:	10 weeks or 20 weeks if created in an integrated practice period Independent preparation of a scient. thesis + colloquium
Credit points / ECTS:	12
Mandatory prerequisites :	Successful completion of the module requires proof of 180 CP from the core, compulsory and compulsory elective areas as well as 18 CP from practical experience.
Recommended prerequisites:	
Intended learning outcomes:	Proof should be provided that a problem from a specialist area of computer science can be worked on under supervision using scientific methods within a specified period of time. On successful completion of the module, students are also able to present and defend solutions to problems they have developed themselves in a structured manner.
Contents:	The topic of the Bachelor's thesis can be derived from current research projects at the institutes or from operational problems of a scientific nature. The assignment is always issued by a university lecturer from the faculties involved in the degree program. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialist discussion. In the colloquium, the topic of the Bachelor's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.

Type of examination:	Passed colloquium
Media:	
Literature:	

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The German version is legally binding

Module title:	Bachelorarbeit (dual)
Engl. module name:	Bachelor Thesis (dual)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 7th semester
Term:	
Module coordinator:	University lecturer at FIN
Lecturer(s):	University lecturer at FIN
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF FIN: B.Sc. FIN: B.Sc. WIF - Core subject
Teaching method / weekly hours:	Bachelor thesis, colloquium
Workload:	20 weeks Independent preparation of a scient. thesis + colloquium
Credit points / ECTS:	12
Mandatory prerequisites :	Successful completion of the module requires proof of 180 CP from the core, compulsory and compulsory elective areas as well as 18 CP from practical phases
Recommended prerequisites:	
Intended learning outcomes:	Proof should be provided that a problem from a specialist area of computer science can be worked on under supervision using scientific methods within a specified period of time. On successful completion of the module, students are also able to present and defend solutions to problems they have developed themselves in a structured manner.
Contents:	The topic of the Bachelor's thesis should be derived from operational problems of the practice partner of the dual study program with a scientific character. The assignment is always issued by a university lecturer from the faculties involved in the degree program. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialist discussion.

	In the colloquium, the topic of the Bachelor's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.
Type of examination:	Passed colloquium
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Bachelor-Projekt
Engl. module name:	Bachelor Project
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 7th semester
Term:	
Module coordinator:	All FIN lecturers
Lecturer(s):	All FIN lecturers
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INF - Study profile - Web founder FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching method / weekly hours:	Project
Workload:	Project-specific
Credit points / ECTS:	18
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Transfer of subject-specific knowledge into practiceAssessment of a practical problem and planning of a solution Development of a suitable solution for a typical practical problem Communication with a client about order content, work progress and results Planning and implementation of a longer-term project
Contents:	Students work on a problem formulated by an external client that is related to their field of study. The subject-related services to be provided and the project organization are agreed with the client. The project organization includes, among other things, a milestone plan and a communication plan for the work progress and the results achieved.
Type of examination:	Ungraded performance on the basis of a project report
Media:	Not applicable
Literature:	Project-specific

English courtesy translation.
The German version is legally binding

English courtesy translation.
The German version is legally binding

Module title:	Bayessche Netze
Engl. module name:	Bayes Networks
Module level, (optional):	
Abbreviation:	BN
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Practical Computer Science / Computational Intelligence
Lecturer(s):	Prof. Dr. Rudolf Kruse
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Independent work = 124 hours: Pre- and post-processing of lecture and exercise Work on exercises and programming tasks
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of probability theory and statistics
Intended learning outcomes:	Teaching of basic concepts and methods of Bayesian networks and related methods for decision support The participant can apply techniques for designing Bayesian networks The participant can apply methods of data analysis to solve problems The participant knows exemplary applications of Bayesian networks and understands how they work in principle
Contents:	Methods for the representation of uncertain knowledge dependency analyses Learning procedure

	Tools for designing Bayesian networks Propagation, Updating, Revision Decision support with Bayesian networks Non-standard methods for decision support such as fuzzy models Case studies of industrial and medical applications
Type of examination:	Examination in written form, duration: 120 minutes, required preliminary work: Completion of two thirds of the exercises Successful presentation in the exercises Appearance Completion of two thirds of the exercises Successful presentation in the exercises Successful participation in the oral colloquium
Media:	
Literature:	Christian Borgelt, Matthias Steinbrecher, and Rudolf Kruse. Graphical Models: Representations for Learning, Reasoning and Data Mining (2nd edition). John Wiley & Sons, Chichester, United Kingdom, 2009.Christian Borgelt, Christian Braune, Heiko Timm, and Rudolf Kruse. Uncertain and vague knowledge. Chapter 9 in Günther Görz, Claus-Rainer Rollinger, and Josef Schneeberger (eds.). Handbook of Artificial Intelligence. Oldenbourg, Munich, 2014. Enrique del Castillo, Jose M. Gutierrez, Ali S. Hadi. Expert Systems and Probabilistic Network Models. Springer, New York, NY, USA, 1997. Finn V. Jensen. An Introduction to Bayesian Networks. UCL Press, London, United Kingdom, 1996. Judea Pearl. Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference (2nd edition). Morgan Kaufmann, San Mateo, CA, USA, 1992.

English courtesy translation.
The German version is legally binding

Module title:	Betriebliches Rechnungswesen
Engl. module name:	Betriebliches Rechnungswesen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Corporate Accounting, Professorship for Business Taxation
Lecturer(s):	Professorship for Corporate Accounting, Professorship for Business Taxation
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	Written exam (60 minutes)
Media:	
Literature:	

Module title:	Bildungswissenschaft und audiovisuelle Kommunikation
Engl. module name:	Bildungswissenschaft und audiovisuelle Kommunikation
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of General Pedagogy
Lecturer(s):	Professorship of General Pedagogy
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Educational Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS Lecture/Seminar Independent work: Independent preparation and follow-up 150h = 2 SWS = 28h attendance time + 122h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: The module is intended to provide an introduction to the field of educational science. Students will acquire the ability to address social problems from a media perspective. Initial experience with practical video work leads students to transfer issues into an audiovisual format. The associated group work promotes communication, cooperation and problem-solving skills.
Contents:	Subject area of educational scienceMedially mediated socialization in childhood, adolescence, adulthood and among senior citizens Media literacy, media education, media education New information technologies and everyday life Learning in virtual worlds Internet as a cultural space Practical video work: script, camera Implementation of a video project Audiovisual communication formats from a historical and systematic perspective
Type of examination:	Examination: term paper, internet project, video project

Media:	
Literature:	

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The German version is legally binding

Module title:	Biochemie
Engl. module name:	Biochemie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	FNW, Prof. W. Marwan
Lecturer(s):	FNW, Prof. W. Marwan
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 2 SWS lecture / 2 SWS practical courseIndependent work: Reviewing the lecture Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28 h attendance time + 62 h independent work) Internship: 2 CP = 60 h (28 h attendance time + 32 h independent work)
Credit points / ECTS:	Lecture: 3 Internship: 2
Mandatory prerequisites :	Passing the biochemistry exam is a prerequisite for participation in the practical course
Recommended prerequisites:	
Intended learning outcomes:	Students acquire basic skills in biochemistry, focusing on the interactions between molecules, their structure and biochemical principles, so that combinatorial thinking is trained. The practical course serves to apply the theoretical knowledge acquired and to acquire skills in special biochemical working techniques.
Contents:	From chemistry to biochemistry: molecules and principlesProteins: Structure and function Enzymes and enzymatic catalysis Structural and motor proteins Central pathways of catabolic and anabolic metabolism Respiration and photosynthesis Membrane proteins and receptors Principles of bioenergetics and membrane biochemistry
Type of examination:	

	Lecture: Written exam 2h. Internship certificate
Media:	
Literature:	Will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Bioinformatik
Engl. module name:	Bioinformatics
Module level, (optional):	
Abbreviation:	BioInf
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Summer semester
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Biology FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area Bachelor BSYT: Compulsory area
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture: 2 SWS weekly exercise: 2 SWS Independent work: Completion of exercises; follow-up of the lecture, preparation for the exam 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired skills: This lecture briefly introduces the basics of molecular biology (previous knowledge in this field is not necessary). The most important methods for analyzing gene data are then introduced, with a focus on algorithmic methods for sequence analysis. This course enables a successful participant to apply standard methods for solving sequence alignment problems as well as to develop their own algorithms for this purpose. In addition, the analysis of standard molecular biology data, in particular sequence and gene expression data, is taught.

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The German version is legally binding

Contents:	Introduction to bioinformatics and molecular biology; introduction to databases and especially molecular biology databases; algorithms for sequence analysis; heuristic methods for sequence analysis; algorithms for cluster analysis; expression data analysis; algorithms for building phylogentic trees
Type of examination:	Services: Processing the exercises Exam: Written exam 120 min (also for Schein)
Media:	Powerpoint, blackboard
Literature:	R. Merkl, S. Waak. Bioinformatics Interactive: Algorithms and Practice. Wiley-VHC, 2003. R. Rauhut. Bioinformatics: Sequence-Structure-Function. Wiley-VHC, 2001. D.E. Krane, ML. Raymer. Fundamental Concepts of Bioinformatics. Pearson Education, 2003. J. Setubal, J. Meidanis. Introduction to Computational Molecular Biology. PWS Publishing Company, 1997. A. M. Lesk. Bioinformatics: An introduction. Spektrum Akademischer Verlag, 2002. A. M. Lesk. Introduction to Bioinformatics. Oxford University Press, 2002.

English courtesy translation.
The German version is legally binding

Module title:	Biologische Psychologie
Engl. module name:	Biologische Psychologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Biological Psychology
Lecturer(s):	Professorship for Biological Psychology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Psychology >>> Parts 1 and 2 can also be credited individually (2 SWS = 4 CP)
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS in WS, 1 SWS in SoSe Independent work: Individual learning time (preparation and follow-up) 138 hrs. 6*30h (42h attendance time + 138h independent work), grading scale according to examination regulations
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Students should learn the biological foundations of human behavior. The course content should enable them to understand both the neuronal causes of general psychological phenomena and the analysis of their disorders in the advanced modules.
Contents:	Lecture 1: Fundamentals and perception systems Heredity, research methods, homeostasis Visual, auditory, gustatory, olfactory and somatosensory systems Shape perception, sound localization in space Motor system Attention, awareness Lecture 2: Biology of behavior and cognition Sleep Learning, memory Language, motivation, emotion Endocrine system, sexuality, ageing

	Psychopathology, music perception, frontal lobe, experimental design
Type of examination:	The module examination is made up cumulatively of the required coursework. The module examination is made up of the average grade achieved in the two lecture examinations. Coursework: Examination during the course (lecture exam at the end of each semester); two graded course achievements must be presented.
Media:	
Literature:	Birbaumer/Schmidt: Biological Psychology, Springer Verlag (ISBN-10 3540254609)

English courtesy translation.
The German version is legally binding

Module title:	Biometrics and Security
Engl. module name:	Biometrics and Security
Module level, (optional):	
Abbreviation:	BIOSEC
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Multimedia and Security
Lecturer(s):	Professorship of Applied Computer Science / Multimedia and Security
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; exercise; preparation of a presentation on a selected topic
Workload:	Attendance times: weekly lecture: 2 SWS weekly exercise incl. presentation topic: 2 SWS Independent work: Review of the lecture and preparation of the presentation 180h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Lecture "Secure Systems" or similar course, a lecture on the basics of pattern recognition
Intended learning outcomes:	Acquisition of a basic understanding of security aspects in biometric systems and the ability to assess themAbility to create concepts for the construction and use of biometric systems for user authentication Ability to perform feature extraction and verification based on similarity calculations
Contents:	Motivation, introduction and technical basics of biometric systems Security aspects for system security Error rates, detection accuracy and counterfeit protection

English courtesy translation.
The German version is legally binding

	Multimodal Biometrics and Multifactor Authentication: Fusion strategies to increase security Examples: Biometrics and security in practice
Type of examination:	Examination performance / form: Presentation The presentation comprises an independent and in-depth written examination of a problem from the context of the course, including and evaluating relevant literature, as well as the presentation of the work and the communication of its results in an oral presentation and in the subsequent discussion. The papers must be submitted in writing.
Media:	
Literature:	see wwwiti.cs.uni-magdeburg.de/iti_amsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Biometrics Project
Engl. module name:	Biometrics Project
Module level, (optional):	
Abbreviation:	MMDAP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Applied Computer Science / Multiemdia and Security
Lecturer(s):	Prof. Dr-Ing. Jana Dittmann, Prof. Dr-Ing. Claus Vielhauer
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	150h = 4 SWS Attendance time = 56h 2 SWS Project-oriented lecture/seminar 2 SWS Project discussion self-employed work = 94h
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	"Algorithms and data structures" "Fundamentals of theoretical computer science", "Secure systems" Internship/seminar on safety topics
Intended learning outcomes:	Ability to work in a team, project work, milestone-oriented responsibility, leadership, delegation, coordination of tasks in a team Practical experience of biometric systems in application within the implementation of a practical project on the topic of

	multimodal data analysis using the example of biometric recognition Development of and compliance with success and quality criteria
Contents:	Basics of project management and teamworkIntroduction to sensor technology and multimedia technology Biometric systems using the example of selected modalities such as face, speech, handwriting and fingerprint Technical integration aspects, implementation of selected content from "Secure Systems" and "Algorithms and Data Structures" Evaluation of biometric systems
Type of examination:	- Term paper or after accession to the examination regulations of November 2013 - Unit
Media:	
Literature:	Literature: see http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Bürgerliches Recht
Engl. module name:	Bürgerliches Recht
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Winter semester
Module coordinator:	Professorship for Civil Law, Commercial and Economic Law, Law and Economics
Lecturer(s):	Professorship for Civil Law, Commercial and Economic Law, Law and Economics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Key and methodological skills - WPF Law
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 4 SWS Independent work: 5 x 30h (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: gain a basic understanding of legal thinking Master the basics of civil law.
Contents:	Fundamentals of legal methodologyLegal business theory and conclusion of contracts Substitution General Terms and Conditions Law of default Sales and work contract law Other types of contracts (in particular loans, rent and leasing, orders and agency) Enrichment law Tort law Possession and acquisition of ownership Property law
Type of examination:	Written exam (120 minutes)

Media:	
Literature:	Legal texts

English courtesy translation.
The German version is legally binding

Module title:	Business Informatics Research: perspectives and outcomes
Engl. module name:	Business Informatics Research: perspectives and outcomes
Module level, (optional):	
Abbreviation:	BIR:PaO
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	every semester
Module coordinator:	Professorship for Information Systems I
Lecturer(s):	Professorship for Information Systems I
Language:	English
Assignment to the curriculum:	FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Seminar
Workload:	Attendance times = 28h.: Independent work = 152 h Term paper and presentation
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Basics of scientific writing and scientific research methods
Intended learning outcomes:	In-depth knowledge of selected research topics in business informatics
Contents:	Presentation of research results from the field of business informatics and presentation of the research methods used to achieve these results.
Type of examination:	Term paper (presentation)
Media:	
Literature:	Announcement at the event

English courtesy translation.
The German version is legally binding

Module title:	CAx-Anwendungen
Engl. module name:	CAx Applications
Module level, (optional):	
Abbreviation:	CAx II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Professorship for Mechanical Engineering Informatics
Lecturer(s):	Professorship for Mechanical Engineering Informatics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercises Independent work: Follow-up of the lecture, independent exercise work outside the actual exercise dates 150h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	CAx basics or equivalent lecture
Intended learning outcomes:	Learning objectives & skills to be acquired: Get to know different CAx applications and their interrelationships Mastering the key elements of product lifecycle management Get to know and master simple simulation methods Master simple PDM applications
Contents:	Product Lifecycle ManagementProcess modeling Networks CAP and NC systems, CAM systems, flexible manufacturing systems, handling systems Simulation method PDM applications and databases
Type of examination:	Achievements: CAD exercise test (90 min), Exam: written (120 min)

Media:	Beamer, overhead, blackboard
Literature:	Vajna, Weber, Bley, Zeman: CAx for Engineers, Springer-Verlag 2008

Module title:	CAx-Grundlagen
Engl. module name:	CAx Fundamentals
Module level, (optional):	
Abbreviation:	CAx I
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Mechanical Engineering Informatics
Lecturer(s):	Professorship for Mechanical Engineering Informatics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: B.Sc. INGINF - WPF Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercises Independent work: Follow-up of the lecture, independent exercise work outside the actual exercise dates 150h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Engineering Informatics II or equivalent lecture
Intended learning outcomes:	Learning objectives & skills to be acquired: Understanding the need for CAD/CAM applications Design and structure of a CAD/CAM system get to know Master the basic elements of a CAD/CAM system for simple modeling tasks Be able to create relevant production documents
Contents:	Methodical basics of computer supportHardware and software of a CAD/CAM system Basic elements of a CAD/CAM system Geometry modeling and product models Working techniques Drawing creation Expansion options
Type of examination:	Achievements: CAD exercise test (90 min),

	Exam: written (120 min)
Media:	Beamer, overhead, blackboard
Literature:	Vajna, Weber, Bley, Zeman: CAx for Engineers, Springer-Verlag 2008

English courtesy translation.
The German version is legally binding

Module title:	Chemie für STK
Engl. module name:	Chemistry
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. rer. nat. Franziska Scheffler
Lecturer(s):	Prof. Dr. rer. nat. Franziska Scheffler
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Process Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times Lecture: weekly 2h (2 SWS) Seminar/exercises: fortnightly 2h (1 SWS) independent work Reviewing the lectures, solving exercises and preparing for exams130h (42h attendance time + 88h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Students should be able to quickly recognize the often complex and abstract relationships in chemistry based on fundamental laws and be able to classify their function and benefits for process engineering processes and systems.
Contents:	1. structure of matter: atoms, orbital bonds, forces 2. introduction to the thermodynamics of chemical reactions: Equilibrium, Catalysis, synthesis, redox processes 3. hydrogen, noble gases, halogens, chalcogens and oxygen: Properties, occurrence, representation, compounds 4. important elements and syntheses: Ammonia, nitrogen oxides, nitric acid, Carbide, carbon monoxide, carbon dioxide, silicon 5. organic compounds: Systematics, nomenclature, bonds, Reaction behavior and mechanisms, nucleophilic and electrophilic Substitution, elimination

	6. oxygen compounds: Alkanols, ethers, phenols, carboxylic acids and Derivatives 7. introduction to stereochemistry: specificity and selectivity, plastics, important solvents, selected large-scale processes
Type of examination:	Exercise certificate, written exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Clean Code Development
Engl. module name:	Clean Code Development
Module level, (optional):	
Abbreviation:	CCD
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IKS
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Computer Science FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 124h independent work on the internship project
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Software Engineering
Intended learning outcomes:	Principles of clean code development Use of various tools and practices Practical experience in the use of professional methods in software engineering

English courtesy translation.
The German version is legally binding

Contents:	Software engineering deals with the production and development of software, the organization and modelling of the associated data structures and the operation of software systems. It therefore covers the areas of software design, implementation and management. The basic lecture Software Engineering I lays the foundations for the good design and writing of software. This advanced lecture introduces modern techniques and methods that are frequently used in the development of large software systems. We are guided by the four central values of "clean code development" - evolvability, correctness, production efficiency and traceability. To achieve these goals, a number of different programming principles and practices are introduced. These include, among others Team building and organization in software development Principles and tools of clean code development Continuous integration and automated build systems Bug tracking, error localization and debugging Automated and model-based testing Code analysis and quality measures Requirements engineering and tracing Distributed and component-based software architectures The course will offer a high degree of practical handling of tools and instruments, especially in its exercise sections. The aim is to impart not only abstract knowledge, but also very practical skills. The exercises are compulsory and are carried out in groups.
Type of examination:	Examination: scientific project
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Cloud School
Engl. module name:	Cloud School
Module level, (optional):	
Abbreviation:	CS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Professorship for Information Systems I
Lecturer(s):	Professorship for Information Systems I
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Preparation and follow-up of lectureDevelopment of solutions for the exercise and consolidation of contentSemester assignmentExam preparation 150 h = 45h attendance time + 105h independent work
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Understanding of the cloud computing paradigm, including characteristics, service and deployment models, workloads and revenue models Understanding of the structure of cloud applications Understanding of how to support cloud principles at the business and application layer and how to select appropriate cloud infrastructure and platform offerings Practical application of cloud design patterns for the development and use of cloud applications for various application scenarios (e.g. machine learning, data science)
Contents:	Cloud Computing Fundamentals Cloud Offering Patterns Cloud Application Architecture Patterns Cloud Application Management Patterns

English courtesy translation.
The German version is legally binding

	Composite Application Pattern Impact of cloud computing properties Cloud Computing Application Scenarios
Type of examination:	Written exam (admission requirement: successful completion of the semester assignment)
Media:	
Literature:	Fehling, C.; Leymann, F.; Retter, R.; Schupeck, W.; Arbitter, P. (2014): Cloud Computing Patterns: Fundamentals to Design, Build, and Manage Cloud Applications (ISBN: 978-3-7091-1567-1), DOI: 10.1007/978-3-7091-1568-8

English courtesy translation.
The German version is legally binding

Module title:	CNC Programmierung
Engl. module name:	CNC programming
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Möhring, FMB-IFQ Other lecturers: Dr. Schmidt, DI Leipelt; FMB-IFQ
Lecturer(s):	Prof. Möhring, FMB-IFQ Other lecturers: Dr. Schmidt, DI Leipelt; FMB-IFQ
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS independent work: Literature study, independent CNC program creation
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of manufacturing theory as well as automation and control technology of machine tools
Intended learning outcomes:	Learning objectives and skills to be acquired: Ability to independently create a CNC program that can run on a machine tool
Contents:	Machining manufacturing processesTool science Computer-aided control systems Basics of CNC programming Manual programming Machine programming on CAD-CAM systems
Type of examination:	Solution of a programming task Oral examination (30min)
Media:	
Literature:	

Module title:	Computational Creativity

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Engl. module name:	Computational Creativity
Module level, (optional):	
Abbreviation:	ComCr
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Theoretical Computer Science
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. DKE - Models department
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: weekly seminar 4 SWS Independent work: Reading the texts Preparation of presentations Follow-up of the seminar In-depth study of literature 180h = 4SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to logic
Intended learning outcomes:	Understanding of fundamental questions and methods of creavity research in computer science.
Contents:	Creativity research in computer science is concerned with computer-aided methods of modeling and understanding human intelligence that can be considered 'creative'. Methods studied in more detail in this seminar include: conceptual blending; analogies and metaphors; Turing test for creativity.
Type of examination:	Admission prerequisite: regular active participation Exam: oral

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Computational Fluid Dynamics
Engl. module name:	Computational Fluid Dynamics
Module level, (optional):	
Abbreviation:	CFD
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professor for Fluid Dynamics
Lecturer(s):	Dr.-Ing. G. Janiga
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Presence: Weekly lecture 1 SWS Weekly exercises 2 SWS (with computer hands-on) Autonomous work: Complementary reading, final project work 90h (42 h presence + 48 h autonomous work)
Credit points / ECTS:	3
Mandatory prerequisites :	Fluid Dynamics
Recommended prerequisites:	Advanced Fluid Dynamics
Intended learning outcomes:	Students participating in this course will get both a solid theoretical knowledge of Computational Fluid Dynamics (CFD) as well as a practical experience of problem-solving on the computer.Best-practice guidelines for CFD are discussed extensively. CFD-code properties and structure are described and the students first realize their own, simple CFD-code, before considering different existing codes with advantages and drawbacks. At the end of the module, the students are able to use CFD in an autonomous manner for solving a realistic test-case, including a critical check of the obtained solutions.
Contents:	Introduction and organization, main discretization methodsVector- and parallel computing, supercomputers, optimal computing loop. Validation procedure, Best Practice Guidelines. Linear systems of equations and iterative solution methods. Practical solution of unsteady problems, explicit and implicit methods, stability.

	Gridding and grid independency. Practical CFD, importance and choice of physical models. Properties and computation of turbulent flows. Properties and computation of Non-newtonian flows. Properties and computation of multi-phase flows. Preparation of final CFD project as teamwork
Type of examination:	Success: Oral defense of final CFD project Exam: oral
Media:	
Literature:	Ferziger and Peric, "Computational Methods for Fluid Dynamics", Springer (2002) Further literature given during first lecture

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Module title:	Computational Geometry
Engl. module name:	Computational Geometry
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Professorship for Theoretical Computer Science / Algorithmic Geometry
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Presentations
Workload:	Attendance times: 3 SWS lecture + presentations 1 SWS exercise Independent work: Work on the exercises and follow up on the lectures, prepare a presentation 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of the basics of algorithmic geometry
Intended learning outcomes:	Learning objectives & acquired skills: Ability to develop algorithms and data structures for challenging geometric problems. Ability to analyze and assess
Contents:	Design principles for geometric algorithms (algorithm design paradigms), classical topics of algorithmic geometry such as arrangements, visibility, simplification and reconstruction problems, geometric optimization problems, higher data structures.
Type of examination:	

	Examination prerequisite: see lecture Exam: oral
Media:	
Literature:	de Berg, Cheong, van Kreveld, Overmars,; Computational Geometry (3rd Edition). Boissonnat, Yvinec; Algorithmic Geometry.

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Module title:	Computational Intelligence in Games
Engl. module name:	Computational Intelligence in Games
Module level, (optional):	
Abbreviation:	CIG
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Intelligent systems
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercises Independent work: Work on exercises and programming tasks for Master students = 180 h = 56 h attendance time + 124 h independent work for Bachelor students = 150 h = 56 h attendance time + 94 h independent work
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Application of computational intelligence methods for problem solving in computer gamesAbility to develop algorithms
Contents:	This course addresses the basic and advanced topics in the area of computational intelligence and games and contains three parts: Part one addresses the basics in Evolutionary Game Theory (EGT). In this part you will learn about simple games such as

	scissors/rock/paper and the main focus on the strategies for playing games. Part two is about learning agents and we focus on reinforcement learning mechanisms. There are three questions for games: - How can we use the information from a search mechanism to learn? - How can we use reinforcement learning to find for a better strategy? - How can we use reinforcement learning as a search mechanism? The application is on board games. Part three contains the advanced topics in games and artificial intelligence such as how can we program an agent who can pass a Turing test? How can we consider physical constraints of a spaceship while moving in an unknown terrain?
Type of examination:	For one bill: Regular participation in lectures and exercises For an exam or graded certificate: Regular participation in lectures and exercises Written exam, 120 min. Master students: Submission of an additional programming task
Media:	
Literature:	Ian Millington and John Funge, Artificial Intelligence for Games, CRC Press, 2009 Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction, MIT Press, Cambridge, MA, 1998 Jorgen W. Weibull, Evolutionary Game Theory, MIT Press, 1997 Thomas Vincent, Evolutionary Game Theory, Natural Selection, and Darwinian Dynamics, Cambridge University Press, 2005 Josef Hofbauer, Karl Sigmund, Evolutionary Games and Population Dynamics, Cambridge University Press, 1998

English courtesy translation.
The German version is legally binding

Module title:	Computer Aided Geometric Design
Engl. module name:	Computer Aided Geometric Design
Module level, (optional):	
Abbreviation:	CAGD
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS lecture / 1 SWS exercise Independent work: Reviewing the lecture Solving the exercises 150 h (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Computer Graphics I Mathematics I to III
Intended learning outcomes:	Learning objectives & acquired skills: Learning the most important techniques for curve and surface modeling Understanding the underlying theoretical principles Application of the approaches to other problems in computer science (data interpolation, data approximation, data extrapolation, numerical methods)
Contents:	Differential geometry of curves and surface Bezier curves Bezier spline curves B-spline curves Rational curves Polar shapes Tensor product Bezier and B-spline surfaces Bezier surfaces over triangles Surface interrogation and fairing

	Subdivision curves and surfaces
Type of examination:	Admission prerequisite: successful completion of the exercises Oral examination Certificate: Passing the oral examination
Media:	
Literature:	G. Farin. Curves and Surfaces for Computer Aided Geometric Design. Morgan Kaufmann, 2002. Fourth edition.G. Farin and D. Hansford. The Essentials of CAGD. AK Peters, 2000. J. Hoschek and D. Lasser. Fundamentals of Geometric Data Processing. B.G. Teubner, Stuttgart, 1989. (English translation: Fundamentals of Computer Aided Geometric Design, AK Peters.) G. Farin. NURB Curves and Surfaces. AK Peters, Wellesley, 1995.

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The German version is legally binding

Module title:	Computer Tomographie - Theorie und Anwendung
Engl. module name:	Computer Tomographie - Theorie und Anwendung
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. rer. nat. Georg Rose (FEIT-IESK)
Lecturer(s):	Prof. Dr. rer. nat. Georg Rose (FEIT-IESK)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise Independent work 180h (42h attendance time + 108h independent work + 30h seminar)
Credit points / ECTS:	6 CP
Mandatory prerequisites :	Digital signal processing, fundamentals of physics
Recommended prerequisites:	
Intended learning outcomes:	Understanding the systems theory of imaging systemsOverview of the physics and functioning of computer tomography Understanding the mathematical procedures for tomographic reconstruction Overview of current research areas in tomographic imaging
Contents:	Beginning with the system theory of imaging systems, the physical properties of X-rays and their interaction with matter are discussed. In the second part, X-ray based projection imaging is discussed. In the third part, the mathematical methods of tomographic imaging are studied in detail and various image reconstruction methods are discussed. The individual contents are: Systems theory of mapping systems Physical basics X-ray tubes and X-ray detectors Projection imaging Reconstruction methods: Fourier-based methods, filtered back projection, algebraic methods, statistical methods Geometries: Parallel, fan and cone beam

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	Implementation aspects Image artifacts and their corrections
Type of examination:	Written examination
Media:	
Literature:	

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Module title:	Computer-Assisted Surgery
Engl. module name:	Computer-Assisted Surgery
Module level, (optional):	
Abbreviation:	CAS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Chair for Computer-Assisted Surgery
Lecturer(s):	Christian Hansen
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Seminar; Project
Workload:	Lecture + Seminar (4SWS) or Lecture + Teamproject (4SWS) for Bachelor students: 150h (56h contact hours + 94h self-study) for Master students: 180h (56h contact ours + 124h self-study)
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The following topics are addressed: Fundamentals of Intraoperative Imaging Fundamentals of Surgical Visualization Computer-Assisted Surgery Planning Surgical Navigation Systems Surgical Augmented Reality Surgeon-Computer Interaction Robotic Surgery Development and Evaluation of Medical Software
Contents:	

	Computer-assisted surgery is an interdisciplinary research field that builds a bridge between surgery and computer science. It represents a set of methods which use computer technology to support preoperative planning, the actual surgery, and postoperative assessment. This module will offer an overview of computer-assisted surgery. After an introduction of fundamentals, the state of the art in computer-assisted surgery is presented on the basis of clinical examples.
Type of examination:	Participation and active involvement in the course and the exercises, successful realization of the exercises and final examination Exam: oral
Media:	
Literature:	

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Module title:	Computergestützte Diagnose und Therapie
Engl. module name:	Computer Aided Diagnosis and Therapy
Module level, (optional):	
Abbreviation:	CDT
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Visualization
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application Subject - Medical Technology Master MSE, BSC Medical Technology
Teaching method / weekly hours:	Lecture; Seminar
Workload:	Attendance times: 2 SWS lecture, 2 SWS seminar Independent work: Follow-up of lecture material, preparation of lectures, exam preparation 180h = 4 SWS = 56h attendance time + 124h self. Work incl. term paper
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Lecture Visualization
Intended learning outcomes:	Understanding of selected diagnostic and therapeutic processesAbility to assess the need for computer supportUnderstanding of the criteria for the acceptance of (new) software solutions in image-based diagnostics and therapy
Contents:	Principles of 3D imaging in medicineDescription of selected diagnostic processes Quantification in image-based diagnostics Computer-aided diagnostics, in particular detection of round lung lesions in CT data and lesions in mammograms Basics and applications of virtual endoscopy Basics and selected examples of planning interventions and operations Computer-aided planning and evaluation of operational strategies Integration of simulation and visualization in therapy planning

	Consideration of case studies: Diagnostics of vascular diseases, planning and intraoperative support of neurosurgical interventions, planning of cervical lymph node evacuations, planning of liver surgery interventions
Type of examination:	Examination prerequisite: see lecture Exam: oral
Media:	
Literature:	Lehmann, Thomas "Digitale Bildverarbeitung für Routineanwendungen", Universitätsverlag, 2005Preim, Bartz "Visualization in Medicine", Morgan Kaufman, 2007 Preim, Botha: Visual Computing for Medicine, 2nd Edition, , Morgan Kaufman, San Francisco, 2013

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Module title:	Computergraphik I
Engl. module name:	Computer Graphics I
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Professorship for Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lectures 2 SWS Exercises Independent work: 94 hours or 124 hours of work on the exercises Bachelor: 5 credit points = 150h = 4 SWS = 56h attendance time + 94h independent work, Master DigiENG: 6 credit points = 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Module Introduction to Computer Science
Intended learning outcomes:	Learning objectives and acquired skills: Acquisition of basic knowledge of the most important computer graphics algorithms Recognizing basic principles of computer graphics enables quick familiarization with new graphics packages and graphics libraries Ability to use graphical approaches for various computer science applications
Contents:	Introduction, history, application areas of computer graphicsModeling and acquisition of graphical data Graphical application programming Transformations

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	Clipping Rasterization and anti-aliasing Lighting Radiosity Texturing Visibility Ray tracing Modern concepts of computer graphics at a glance
Type of examination:	Examination prerequisites: Successful completion of the exercises Completion of a programming task Exam: Written exam, 120 min. Certificate: Passing the exam
Media:	
Literature:	J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes: Computer Graphics - Principles and Practice (second Edition). Addison-Wesley Publishing Company, Inc, 1996J. Encarnacao, W. Straßer, R. Klein: Gerätetechnik, Programmierung und Anwendung graphischer Systeme, Teil I und II. Oldenbourg, Munich, Vienna, 1966, 1997 D. Salomon: Computer Graphics Geometric Modeling, Sprin-ger, 1999 A. Watt: 3D Computer Graphics. Addison-Wesley Publishing Company, Inc., 2000

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Module title:	Computernetze
Engl. module name:	Computer Networks
Module level, (optional):	
Abbreviation:	ComNets
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Computer Engineering / Communication and Net-worked Systems
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 h 2 SWS Lecture 2 SWS Exercise Bachelor: Independent work = 94 h Processing of exercises and programming tasks & exam preparation
Credit points / ECTS:	Bachelor: 5
Mandatory prerequisites :	
Recommended prerequisites:	Computer Engineering ITComputer Engineering II Programming paradigms Algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired skills: Comprehensive understanding of the basics of computer networks Ability to understand and categorize the basic layer architecture and apply the essential protocols of the Internet Competence to analyze the basic security aspects and implement them accordingly in communication services

	For Master's students: advanced skills in scientific research and writing
Contents:	Contents Basic protocols and approaches from the physical layer to the application layer ISO/OSI architecture vs TCP/IP architecture Data transmission Media access control Error handling Reliable message transmission Communication security Basic services at application level
Type of examination:	Services: Regular participation in lectures and exercises Successful completion of a programming task Exam: Written exam 120 min
Media:	
Literature:	A detailed literature list will be announced in the lecture. Basic literature: Andrew S. Tanenbaum, "Computer Networks", Pearson International James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach", Addison Wesley

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Module title:	Computernetze 2
Engl. module name:	Computer Networks 2
Module level, (optional):	
Abbreviation:	ComNets2
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Mesut Güneş
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 h - 2 SWS lecture - 2 SWS Exercise Bachelor: Independent work = 94 h - Processing of exercises and programming tasks & exam preparation Master: Independent work = 124 h - Processing of exercises and programming tasks to an extended extent & exam preparation
Credit points / ECTS:	5 credit points
Mandatory prerequisites :	
Recommended prerequisites:	- Computer Engineering I - Computer Engineering II - Programming paradigms - Algorithms and data structures - Computer networks
Intended learning outcomes:	Comprehensive understanding of the basics of computer networksAbility to understand and classify the basic layer architecture and to apply the essential protocols of the InternetCompetence to analyze the basic security aspects and to

	implement them accordingly in communication servicesFor Master's students: advanced skills in scientific research and writing
Contents:	Contents Basic protocols and approaches up to the application layerISO/OSI architecture vs TCP/IP architectureInternet protocolsTransport layer protocols TCP, UDPApplication layer protocolsCommunication securityApplication layer protocols and services Protocols for the Internet of Things
Type of examination:	Achievements:Regular participation in lectures and exercisesSuccessful completion of a programming task Exam: Written exam 120 min
Media:	
Literature:	A detailed literature list will be announced in the lecture. Basic literature: Andrew S. Tanenbaum, "Computer Networks", Pearson International James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach", Addison Wesley

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Module title:	Computerspiele als kulturelles Phänomen
Engl. module name:	Computerspiele als kulturelles Phänomen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	FHW, IEW, Chair of Media and Adult Education
Lecturer(s):	Prof. Dr. J. Fromme
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. CV - General Visualistics - Educational Science FIN: B.Sc. INF - Study profile - Computer Games
Teaching method / weekly hours:	Seminar
Workload:	variable
Credit points / ECTS:	variable
Mandatory prerequisites :	
Recommended prerequisites:	Modules 1 to 5 should have been completed.
Intended learning outcomes:	The module aims to impart basic knowledge about the social and cultural relevance of the phenomenon of computer games. On the one hand, students will become familiar with approaches for describing and analyzing computer games and will be able to analyze different types of digital games themselves. On the other hand, they learn about and assess approaches to explaining the fascination and possible risks of computer games. This also includes empirical and theoretical descriptions as well as analyses of social and cultural phenomena in the context of computer games (offline and online)
Contents:	Economic and technical aspects of video and computer gamesMethods of analyzing and evaluating computer games Mythical content of video and computer games Social and cultural contexts of computer games Clans, guilds and other forms of online and offline socialization Computer games between fascination and risk Youth media protection Convergence phenomena (computer games and other media)
Type of examination:	Prerequisite for the awarding of credit points is regular participation in the coursesStudy achievements: at least 1 graded and 1 ungraded LN Form of module examination: graded performance record The examination grade results from the grade of the LN

	Total number of credits for the module: 10 CP
Media:	
Literature:	

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Module title:	Data Management for Engineering Applications
Engl. module name:	Data Management for Engineering Applications
Module level, (optional):	
Abbreviation:	DMEA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Computer Systems
Lecturer(s):	Dr. Eike Schallehn
Language:	English
Assignment to the curriculum:	FIN: B.Sc. INGINF - WPF Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DKE (old) - Applications area
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercises & exam preparation Bachelor: 5 credit points = 150h = 4SWS = 56h attendance time + 94h independent work Master: 6 credit points = 180h = 4 SWS = 56h attendance time + 94h independent work + 30h task (laboratory exercise)
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Identifying, describing and classifying engineering applications, basic understanding of information systems, ability to design a database in the context of an engineering application
Contents:	Introduction to the design of relational database systems, product data management with database systems, workflow support and interoperability, data management in automation
Type of examination:	Exam prerequisite: registration and participation in the lecture and exercise Examination or certificate: written 120min

Media:	
Literature:	See http://wwwiti.cs.uni-magdeburg.de/iti_db/lehre/

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Module title:	Data Mining – Einführung in Data Mining
Engl. module name:	Data Mining
Module level, (optional):	
Abbreviation:	DM4BA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Winter semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture and exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 150h=56h attendance time+94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basics of computer science, databases, programming
Intended learning outcomes:	Learning objectives & acquired skills: Acquisition of basic knowledge of data mining Application of data mining knowledge to solve real, simplified problems Familiarity with data mining tools Confident handling of German and English literature on the subject area
Contents:	Data and data preparation for data miningData mining methods for: Classification, clustering, discovery of association rules Data mining tools and software suites Case studies
Type of examination:	

	Preliminary work:Successful completion of the exercisesPresentation of results Modalities will be given at the beginning of the event. Exam: written (in German)
Media:	
Literature:	Ian Millington and John Funge, Artificial Intelligence for Games, CRC Press, 2009 Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction, MIT Press, Cambridge, MA, 1998 Jorgen W. Weibull, Evolutionary Game Theory, MIT Press, 1997 Thomas Vincent, Evolutionary Game Theory, Natural Selection, and Darwinian Dynamics, Cambridge University Press, 2005 Josef Hofbauer, Karl Sigmund, Evolutionary Games and Population Dynamics, Cambridge University Press, 1998 The bibliography may include additional case studies and other academic papers. These will be announced at the beginning of each course block.

English courtesy translation.
The German version is legally binding

Module title:	Data Mining I - Introduction to Data Mining
Engl. module name:	Data Mining I - Introduction to Data Mining
Module level, (optional):	
Abbreviation:	DM_ENG
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area WPF for Export (except Master Statistics) For approval / assignment to curricula of interdisciplinary degree programs and degree programs outside the FIN, see study documents of the respective degree program.
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture and exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 6 CP = 56h attendance time (4 SWS) + 124h independent work
Credit points / ECTS:	6 Export: The number of CP is determined in the study documents of the respective importing degree program.
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Acquisition of basic knowledge of data mining Application of data mining knowledge to solve real, simplified problems Familiarity with data mining tools Confident handling of English-language literature on the subject area
Contents:	Data and data preparation for data miningData mining methods for: Classification, clustering, discovery of association rules Data mining tools and software suites Case studies

Type of examination:	Advance payments: Successful completion of the exercisesPresentation of results Modalities will be given at the beginning of the event. Exam: written (in English)
Media:	
Literature:	The bibliography may include additional case studies and other academic papers. These will be announced at the beginning of each course block."

English courtesy translation.
The German version is legally binding

Module title:	Data Mining II - Advanced Topics in Data Mining
Engl. module name:	Data Mining II - Advanced Topics in Data Mining
Module level, (optional):	
Abbreviation:	DM2
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science WPF for Master Statistics (Export) For release / assignment to curricula of interdisciplinary degree programs and degree programs outside the FIN, see study documents of the respective degree program.
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture and exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 6 CP = 56h attendance time (4 SWS) + 124h independent work
Credit points / ECTS:	6 Export: The number of CP is determined in the study documents of the respective importing degree program.
Mandatory prerequisites :	
Recommended prerequisites:	Basics of: Data Mining
Intended learning outcomes:	Learning objectives & acquired skills: This module teaches how high-dimensional, complex, dynamic data can be analyzed using mining methods. The module provides knowledge of methods and skills for data analysis and evaluation, i.e. for using the methods in selected application scenarios.
Contents:	

	Data Mining Methods for Data Science:Stream MiningLearning on time series forclassificationpredictionApplications from medical research, web applications
Type of examination:	Preliminary work:Successful completion of the exercisesPresentation of results Modalities will be given at the beginning of the event. Exam: written
Media:	
Literature:	Scientific articles (information at the beginning of the semester) The bibliography may include additional case studies and other academic papers. These will be announced at the beginning of each course block.

Module title:	Data Science with R
Engl. module name:	Data Science with R
Module level, (optional):	
Abbreviation:	DataSciR
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Information Systems II - Knowledge Management & Discovery
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance time = 28 h: - 2 SWS weekly seminar; Independent work outside the actual seminar dates = 152 h: - 76 h preparation and follow-up of the seminar topics - 76 h solving the tasks, incl. work in the laboratory 180h = 28h attendance time + 152h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	Area 1: Data mining, machine learning, artificial intelligence Area 2: Databases Area 3: Programming languages and software engineering Area 4: Stochastics, applied statistics
Recommended prerequisites:	
Intended learning outcomes:	The course is about learning from data to perform predictions and obtain useful insights. In the seminar, we will use the statistical programming language R. Necessary skills to manage and analyze data will be taught and practiced on real-world applications. Programming knowledge of other courses are helpful but not mandatory. However, students are ex-pected to have a profound knowledge of fundamental data analysis techniques, such as classification, regression and clustering.

	After successful completion of this course, the student will be able to proficiently perform the following tasks in R: Import and preprocess raw data (files, databases, web APIs) Transform data for modeling Perform exploratory data analysis with summary statistics and visualization Understand, build and evaluate predictive classification and prediction models, including regression models, tree-based models, ensembles and boosted models Communicate and disseminate results and findings through reproducible documents, presentations, websites and interactive web applications
Contents:	Part Fundamentals & Visualization: Basics, scripts, workflows, vectors & functions in R Explorative data visualization Data transformation Part Data Management & Exploratory Data Analysis: Data wrangling/munging/cleaning & scraping Generating hypotheses and an intuition about the data with exploratory data analysis Data import Tidy data management Relational data Strings, categorical data, dates & time Iteration: imperative & functional programming Part Modeling: Linear regression Classification Evaluation Model selection & regularization (LASSO, Ridge) Feature selection & model interpretation Decision trees Ensembles: random forests Boosting: gradient boosted trees Unsupervised learning, e.g. k-means, hierarchical clustering, self-organizing maps, principal component analysis Topic modeling with simple graphical models Statistical testing Part Communication: Communication and dissemination of results through visualization and interpretable summaries with documents, notebooks, presentations & websites Interactive web-based applications
Type of examination:	Examination form: term paper
Media:	
Literature:	The list of recommended literature is provided as part of the slide set.

English courtesy translation.
The German version is legally binding

Module title:	Data Warehouse-Technologien
Engl. module name:	Introduction to Data Warehousing
Module level, (optional):	
Abbreviation:	DWT
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Computer Systems
Lecturer(s):	Dr. David Broneske
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; exercise; lectures, exercises and practical exercises in the laboratory (including presentation to the exercise group) as well as independent work (solving exercises, studying literature)
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Course "Databases I" and "Databases II"
Intended learning outcomes:	Learning objectives & acquired skills: Understanding the data warehouse approach Understanding of database technologies in the environment of data warehouses Ability to use DW-specific DBMS functionality Ability to design and develop a data warehouse application
Contents:	The data warehouse approach, differentiationArchitecture Extract-Transform-Load OLAP and the multidimensional data model Implementation in databases

	Request processing and optimization Index and storage structures Business Intelligence
Type of examination:	Prerequisite for admission to the examination: Registration and participation in the exercises Exam: oral
Media:	
Literature:	Data Warehouse Technologies. Veit Köppen, Gunter Saake Kai-Uwe Sattler. 2nd edition, mitp-Verlag, 2014

English courtesy translation.
The German version is legally binding

Module title:	Database Concepts /Databases
Engl. module name:	Database Concepts /Databases
Module level, (optional):	
Abbreviation:	DB 1
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Gunter Saake
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Apply FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers Mathematics/ Mathematics AF Computer Science: 5th semester English Course in summer semester
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Time of Presentness = 56h2 SWS Lecture2 SWS ExerciseWork = 94hPreparing for Exercises & ExamMaster + 30h additional Exercises
Credit points / ECTS:	Bachelor 5Master 6
Mandatory prerequisites :	Cannot be attended together with "Databases 1"
Recommended prerequisites:	
Intended learning outcomes:	Basic Understanding of Database Systems (Terminology, Basic Concepts)Techniques to Design a Relational DatabaseKnowledge about Relational Database LanguagesConcepts to Implement Database Applications
Contents:	Properties of Database SystemsArchitecturesConceptual Design of Relational DatabasesRelational Database ModelMapping of ER-Schemas to RelationsDatabase Languages (Relational Algebra, SQL)Formal Design Criteria and NormalizationDatabase Application ProgrammingFurther Database Concepts, e.g., Views, Triggers, Access Rights
Type of examination:	Exam Requirements Application and Successful Completion of Ex-ercisesExam Written Exam (120 min)
Media:	
Literature:	Databases - Concepts and Languages. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer, March 2013, ISBN 3-8266-9453-8, Mitp-Verlag; Edition 5Fundamentals of Database Systems. Ramez Elmasri, Shamkant B. Navathe, April 2010, ISBN 0-136-08620-9, Addison Wesley; Edition 6

English courtesy translation.
The German version is legally binding

Module title:	Datenanalyse, Visualisierung und Visual Analytics
Engl. module name:	Data Analysis, Visualization and Visual Analytics
Module level, (optional):	
Abbreviation:	DataVisVA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Winter semester
Module coordinator:	Professorship Visual Computing
Lecturer(s):	Dr. Dirk Joachim Lehmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS weekly lecture Independent work: Reviewing the lecture Exam preparation Writing an extensive term paper 150 h (28h attendance time + 42h independent follow-up work + 60h term paper + 20h exam preparation)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of statistics, image processing and visualization
Intended learning outcomes:	Learning objectives & skills to be acquired: Methods of classical data analysis Methods of interactive visual data analysis Opportunities and limitations of combining both approaches (visual analytics) Visual analytics methods Understanding of application areas of visual analytics Ability to independently select suitable techniques - whether visual, interactive or automated - to solve a data analysis problem. (solution orientation) Ability to recognize when a data analysis problem cannot be addressed with existing techniques. (Effectiveness & problem awareness) Ability to independently develop further analysis techniques from the literature. (Independence)

Contents:	Biological and cognitive foundationsData models and their formal description Overview of classic (automatable) data analysis topics Visual search vs. automatic data analysis: comparison of the respective advantages and disadvantages and complementary features Spectrum of interactive visualization techniques and visual manipulation techniques of explorative visual data analysis Dimension-reducing techniques (multivariate projections) for the visual search for patterns, quality measures for the automated evaluation of visualizations, interpretation rules for selected visualizations Scaling problem, oversubscription problem, subspace clustering Visual design = methods for selecting suitable visualization approaches depending on the domain and data type of the underlying data Visual analytics, as a combination of automatic data analysis (pre-process, e.g. for data reduction) and interactive multiple visualization techniques Current tools, implementations and evaluations for visual analytics in practical application, open problems
Type of examination:	Prerequisite: Participation in lecture, passed term paper Exam: written exam (written test) Certificate: Passing the exam
Media:	Powerpoint, blackboard, video, software demonstrations
Literature:	Literature references during the lecture.

English courtesy translation.
The German version is legally binding

Module title:	Datenbanken
Engl. module name:	Databases
Module level, (optional):	
Abbreviation:	100391
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Gunter Saake
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Apply FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times = 56h: 2 SWS lecture, 2 SWS exercise Independent work = 94h: Exercises & exam preparation Master: + 30h additional task
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	Cannot be taken together with "Database Concepts"
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Basic understanding of database systems (terms, basic concepts) Ability to design a relational database Knowledge of relational database languages Ability to develop database applications
Contents:	Properties of database systemsArchitectures Conceptual design of a relational database Relational database model Mapping ER schema to relations Database languages (relational algebra, SQL) Formal design criteria and normalization theory Application programming Other database concepts such as views, triggers, assignment of rights

Type of examination:	Exam prerequisite: Registration and participation in the exercises Examination/Certificate: written (120 min)
Media:	
Literature:	Databases - concepts and languages. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer. March 2013, ISBN 3-8266-9453-8, Mitp-Verlag; Edition: 5th, updated and expanded ed.

English courtesy translation.
The German version is legally binding

Module title:	Datenbankimplementierungstechniken
Engl. module name:	Database Implementation Techniques
Module level, (optional):	
Abbreviation:	DB II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Gunter Saake
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times = 56h: 2 SWS Lecture 2 SWS Exercise Work = 94h: Exercises & exam preparation Master: + 30h additional task
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Databases [100391]
Intended learning outcomes:	Learning objectives & acquired skills: Knowledge of how database management systems work Ability to physically design database systems Ability to administer and tune database systems Ability to develop components of data bank management solutions

English courtesy translation.
The German version is legally binding

Contents:	Tasks and principles of database systemsArchitecture of database systems Management of the background memory File organization and access structures Access structures for special applications Basic algorithms for database operations Optimization of requests
Type of examination:	Successful completion of semester assignments (issued at the beginning of the semester) Examination/Certificate: written
Media:	
Literature:	Databases: Implementation Techniques. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer, 3rd edition mitp-Verlag, Bonn, 2011, ISBN 978-3826691560

English courtesy translation.
The German version is legally binding

Module title:	Deep Learning for Computer Vision
Engl. module name:	Deep Learning for Computer Vision
Module level, (optional):	
Abbreviation:	DLCV
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Image Processing/Image Understanding
Lecturer(s):	Prof. Dr. Vasileios Belagiannis
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	In class teaching: 2 SWS lecture / 2 SWS tutorial Self-study: Self-study of lecture material Active participation in the lecture and successful participation in the project
Credit points / ECTS:	6 Credit Points = 180 h (56h in class + 124h self study), grading scheme according to exam regulations
Mandatory prerequisites :	none
Recommended prerequisites:	Programming skills, basic knowledge in deep learning in connection to computer vision.
Intended learning outcomes:	Learning of the basics of deep learning with focus on computer vision.Principles of neural networks, including convolutional neural networks, recurrent neural networks, and graph models.Exercises with the implementation of standard models for classification or regression.
Contents:	Machine learning basics, neural networks, back-propagation, optimization.Data pre-processing (image, video), model trainingConvolutional neural networks, modern deep architectures, auto-encoders, sequential models, generative modelsComputer vision applications (object detection, segmentation, pose estimation).
Type of examination:	Written exam 120 min.

Media:	
Literature:	Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep learning. MIT press, 2016.

English courtesy translation.
The German version is legally binding

Module title:	Deep Learning for Weather and Climate
Engl. module name:	Deep Learning for Weather and Climate
Module level, (optional):	
Abbreviation:	DLWC
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Christian Lessig
Lecturer(s):	Prof. Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Block seminar
Workload:	In class teaching: 2 SWS lecture / 2 SWS tutorial Self-study: Self-study of lecture material Solution of exercises and assignments
Credit points / ECTS:	6 Credit Points = 180 h (56 in class + 124 self-study and work on project), grading scheme according to exam regulations
Mandatory prerequisites :	None
Recommended prerequisites:	Knowledge from the courses: - Introduction + Advanced Deep Learning - Scientific Computing I+II
Intended learning outcomes:	Climate change is one of the fundamental challenges facing humanity. Existing climate simulations provide important insights into how humans affect and are affected by climate change. However, these simulations also still have substantial deficiencies, e.g. in the representation of uncertainties and of local impacts. The profound recent advances in deep learning

	provide a new tool to address these deficiencies, in particular given the petabytes of domain data available for training. In this seminar, we will discuss some fundamentals of Earth system modeling and climate and weather simulations. Then, students will explore the subjects by implementing small prototype systems (using prepared datasets and auxiliary code).
Contents:	Fundamentals of Earth system modeling for weather and climateImplementation and presentation of simple case studies of how deep learning methods can help to better understand climate change
Type of examination:	Presentation
Media:	Board, slides, code examples, videos
Literature:	K. Bi, L. Xie, H. Zhang, X. Chen, X. Gu, and Q. Tian. Accurate medium-range global weather forecasting with 3d neural networks. Nature, 2023.R. Lam, A. Sanchez-Gonzalez, M. Willson, et al. Graphcast: Learning skillful medium-range global weather forecasting, 2022.O. Watt-Meyer, G. Dresdner, J. McGibbon, et al. ACE: A fast, skillful learned global atmospheric model for climate prediction, 2023.

English courtesy translation.
The German version is legally binding

Module title:	Design Repertoire
Engl. module name:	Design Repertoire
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Interaction Design, Institute of Industrial Design, Department of Engineering and Industrial Design, Magdeburg-Stendal University of Applied Sciences
Lecturer(s):	Prof. Steffi Hußlein
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Internship; Seminar; Project
Workload:	Attendance times 2 SWS Seminar 2 SWS Internship Independent work: 80 h Independent practice work 20 h research work 20 h Presentation preparation and documentation 180h =(4 SWS = 60 h attendance time + 120 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	This module is an introduction to interaction design for all Master's students who do not come from a direct design background and serves to clarify fundamental questions, for example about the typical working methods in design. It is also suitable as a refresher and in-depth course for students with design experience. It teaches the basics of the presentation of networked interactive information contexts, information design and the conception of structure, control and orientation of complex interaction processes and information architecture. Questions are worked on in interdisciplinary teams of prospective designers and computer visualists. Design principles and tools are presented that are used in the design of interactive screen-based systems. Strategically oriented design in media contexts is combined with the training of visual analytical skills in the aesthetics and semiotics of interactive networked media systems. In addition to the design principles of

	feedback, continuity, consistency and plausibility, the importance of mental models and metaphors, as well as the organization and navigation of and in information sets, will be addressed.
Contents:	Systematic competence development by applying the solution strategies of the Design Repertoire using the example of application-oriented tasks. Focal points: Analyze, structure, design and develop interaction formats for screen-based interaction Analyze, structure, design and develop interaction formats for TUI, NUI Information design, GUI design and information architecture for interactive systems, services and apps The in-depth teaching of design and conceptual principles for media systems is intended to consolidate the ability to make decisions on design issues in interaction design and to develop independent competence and stylistic confidence in design. Students are enabled to understand the information structures of networked processes and to design and present dynamic systems. The focus is on the development of individual design skills and the development of an individual design repertoire for the interaction design process Education repertoire Teaching theoretical, creative and conceptual basics of visual communication for screen design Deepening methods of designing information and operating structures in dynamic processes of interactive systems Developing your own design skills
Type of examination:	Services: Presence, participation in the team's interdisciplinary design with computer science-specific contributions, participation in the public presentation and contribution to the joint documentation of the design. Exam: oral
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Design-Projekt
Engl. module name:	Design project
Module level, (optional):	
Abbreviation:	DSP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems The course can also be credited as a "Scientific Team Project" or "Scientific Team Project - Management Information Systems".
Teaching method / weekly hours:	Exercise; Seminar
Workload:	Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Bachelor: Independent work = 94 h Master: Independent work = 124 h
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The aims of the course are: -Developing an understanding of industrial design -Discussion of the "Ten Theses of Good Design" by Dieter Rams -Developing an understanding of the design of current ICT products

Contents:	In this course, students will apply their newly acquired knowledge of design to ICT products. The main focus here is on the "Ten Theses of Good Design" developed by Dieter Rams.
Type of examination:	The examination is a term paper written in a group. Participation in the face-to-face sessions is essential for the successful completion of this paper. Examination: Term paper A preliminary examination is not required. FIN: B.Sc. WIF - WPF Verstehen & Gestalten: only graded creditable.
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Deutsch als Fremdsprache A2 BiBa
Engl. module name:	German as a Foreign Language A2 BiBa
Module level, (optional):	
Abbreviation:	DaF-A2 BiBa
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Claudia Krull
Lecturer(s):	Language Center
Language:	---
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Language
Teaching method / weekly hours:	Lecture; Exercise; Seminar
Workload:	8 SWS 4 SWS during the semester, 4 SWS in 3 weeks as an intensive course during the semester break
Credit points / ECTS:	8 CP
Mandatory prerequisites :	
Recommended prerequisites:	Proven language level A1
Intended learning outcomes:	German level A2 according to CEFR
Contents:	
Type of examination:	Exam at language level A2
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Deutsch als Fremdsprache B1 BiBa
Engl. module name:	German as a Foreign Language B1 BiBa
Module level, (optional):	
Abbreviation:	DaF-B1 BiBa
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Dr. Claudia Krull
Lecturer(s):	Language Center
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Language
Teaching method / weekly hours:	Lecture; Exercise; Seminar
Workload:	8 SWS 4 SWS during the semester, 4 SWS in 3 weeks as an intensive course during the semester break
Credit points / ECTS:	8 CP
Mandatory prerequisites :	
Recommended prerequisites:	passed language level A2
Intended learning outcomes:	German level B1 according to CEFR
Contents:	
Type of examination:	Exam at language level B1
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Deutsch als Fremdsprache B2 BiBa
Engl. module name:	German as a Foreign Language B2 BiBa
Module level, (optional):	
Abbreviation:	DaF-B2 BiBa
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Start every winter semester over 2 semesters
Module coordinator:	Dr. Claudia Krull
Lecturer(s):	Language Center
Language:	German
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Language
Teaching method / weekly hours:	Lecture; Exercise; Seminar
Workload:	8 SWS 2 x 4 SWS during the semester over 2 semesters
Credit points / ECTS:	8 CP
Mandatory prerequisites :	
Recommended prerequisites:	passed language level B1
Intended learning outcomes:	German level B2 according to CEFR
Contents:	
Type of examination:	Exam at language level B2
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Digital Engineering Project
Engl. module name:	Digital Engineering Project
Module level, (optional):	
Abbreviation:	DE project
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	
Module coordinator:	supply-specific
Lecturer(s):	supply-specific
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Digital Engineering Project
Teaching method / weekly hours:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 360h = 12 weeks of 30 hours each
Credit points / ECTS:	12
Mandatory prerequisites :	
Recommended prerequisites:	supply-specific
Intended learning outcomes:	The digital engineering project gives students a realistic introduction to the challenges of interdisciplinary project work. In this project, students work together in teams (usually 2-5 people) on an innovative, interdisciplinary task. The aim is for students to gain practical experience in project work that is based on the division of labor and spans competencies and disciplines. Digital Engineering projects are therefore often organized across faculties and/or in cooperation with institutes of applied research. In addition to in-depth specialist knowledge, students are introduced to scientific work, e.g. by working on scientific publications or participating in scientific events. Upon justified request, the digital engineering project can be divided into two sub-projects.
Contents:	This module is implemented by different university lecturers. The subject-specific content is therefore offer-specific.
Type of examination:	supply-specific
Media:	
Literature:	

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The German version is legally binding

Module title:	Digital Information Processing
Engl. module name:	Digital Information Processing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. A. Wendemuth, FEIT-IESK
Lecturer(s):	Prof. Dr. A. Wendemuth, FEIT-IESK
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Time of attendance 2 hours/week - lecture 1 hours/week - exercises Autonomous work: post processing of lectures preparation of exercises and exam 120 h (42 h time of attendance and 78 h autonomous work)
Credit points / ECTS:	4
Mandatory prerequisites :	Bachelor in Electrical Engineering or related studies Knowledge of signals and systems, Analog Fourier transformations
Recommended prerequisites:	
Intended learning outcomes:	The participant has an overview of basic problems and methods of digital signal processing.The participant understands the functionality of a digital signal processing system and can mathematically explain the modus of operation. The participant can assess applications in terms of stability and other markers. He / She can calculate the frequency response and reconstruction of analog signals. The participant can perform these calculations and assessments as well on stochastically excited digital systems. The participant can apply this knowledge in a field of specialization, e.g. Medical Signal Analysis
Contents:	Digital Signals and Digital LTI SystemsZ-Transform and Difference Equations Sampling and Reconstruction Synthesis and analysis of such systems Discrete and Fast Fourier Transforms

	Processing of Stochastic Signals by LTI-Systems: Correlation Techniques and Model-Based Systems (ARMA) Selected Specialization Topics, e.g. Medical Signal Analysis
Type of examination:	Mandatory participation in exercise classes, successful results in exercises / written exam at the end of the course
Media:	
Literature:	Wendemuth, A (2004): "Grundlagen der Digitalen Signalverarbeitung", 268 pages, Springer Verlag, Heidelberg. ISBN: 3-540-21885-8 Oppenheim, A; Schafer R (1975): "Digital Signal Processing" 784 pages, Prentice Hall, ISBN: 0132146355

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Module title:	Digitale Medien im Unterricht (Medienpraxis)
Engl. module name:	Digital media in the classroom (media practice)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Henry Herper
Lecturer(s):	Dr. Henry Herper
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Educational Science FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Present tense: 2 SWS Lecture 1 SWS exercise 1 SWS Internship Independent work: Follow-up of the lecture and exercise, solving the exercises Creating a teaching project for notebook classes using classroom controls and interactive whiteboards Exam preparation Bachelor: 5 credit points = 150 hours (56 hours of attendance time in lectures and exercises + 94 hours of independent work) Master: 6 credit points = 180 hours (56 hours of attendance time in lectures and exercises + 124 hours of independent work) through additional work
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The students know the basics of visualization and perception can independently prepare and manage digital teaching materials can create digital blackboard images using multimedia components in the classroom are able to use digital measuring and recording systems in conjunction with interactive displays

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	know methods for teaching with notebook classes with interactive displays and using didactic classroom controls
Contents:	Basics of visualization and perceptionUse of interactive whiteboards in the classroom Integration of multimedia components into the blackboard design Digital experimentation in science lessons Teaching methods for interactive whiteboards, classroom controls and notebook classes Learning status surveys in notebook classes Developing subject-specific teaching projects Legal foundations and social effects of media use
Type of examination:	Examination: Scientific project
Media:	
Literature:	see http://lehramt.cs.uni-magdeburg.de/Skripte/Didaktik/index.html

English courtesy translation.
The German version is legally binding

Module title:	Digitale Planung in der Automatisierungstechnik
Engl. module name:	Digitale Planung in der Automatisierungstechnik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr. Christian Diedrich, FEIT-IFAT
Lecturer(s):	Prof. Dr. Christian Diedrich, FEIT-IFAT
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS; tutorials 1 SWS Independent work: Reviewing the lecture; solving the exercises and preparing for the exam 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	The course is suitable for students of engineering degree programs.
Recommended prerequisites:	
Intended learning outcomes:	Planning process with the phases of project management Planning using modern CAD systems Special requirements and examples from process and production engineering Information technology view of the technical and organizational processes Use of an industrial planning tool (e.g. COMOS)
Contents:	The planning of production and process engineering systems, in particular automation components, is a complex field of knowledge and teaching that has been put on a solid scientific footing in recent years. The aim of the lecture is to systematically convey these conceptual and methodological principles. The individual phases and contents of the end-to-end planning process are described and the basics of digital planning are taught. In this way, students are enabled to work cooperatively with engineers from other disciplines, e.g. process engineers,

	mechanical engineers, production engineers and plant designers and other investment partners. Students should be able to critically examine the conception of automation objects, formulate automation goals and tasks and influence the automation-oriented design of technological systems to achieve greater effectiveness.
Type of examination:	Compulsory participation in the exercises, successful completion of the exercises, examination exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Digitaler Schaltungsentwurf mit FPGAs
Engl. module name:	Digitaler Schaltungsentwurf mit FPGAs
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Engineering FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, bi-weekly exercises 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 3 SWS / 4 credit points = 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	Electrical circuit technology
Intended learning outcomes:	Learning objectives and acquired skills: After successfully completing the module, students should be able to independently design a digital circuit with VHDL based on a non-formal description of a digital system. They will be able to create VHDL descriptions suitable for synthesis and assess the effects of different description styles on the synthesis result. Students will be able to explain the VHDL simulation cycle and the special features of circuit design for FPGAs. They can name the different steps in synthesis and explain how procedures for estimating synthesis results work. In practical exercises, students learn how to independently create standard components, test them on an FPGA and integrate them into a larger project.
Contents:	Levels of abstraction in circuit designDesign process and design strategies

	Structure of modern FPGAs Introduction to the hardware description language VHDL Modeling of standard components in VHDL Consideration of different degrees of abstraction of the circuit design Synthesis-oriented circuit design VHDL simulation cycle Special features of VHDL design for FPGAs Creation of test environments Effects of specifications in circuit synthesis Estimation of synthesis results
Type of examination:	Completion of the exercises, oral examination
Media:	
Literature:	

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The German version is legally binding

Module title:	Digitalhandwerk
Engl. module name:	Digital craft
Module level, (optional):	
Abbreviation:	DHW
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems The course can also be credited as a "Scientific Team Project" or "Scientific Team Project - Management Information Systems".
Teaching method / weekly hours:	Exercise; Seminar
Workload:	Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Bachelor: Independent work = 94 h Master: Independent work = 124 h
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The aims of the course are: -Reflection on the personal approach to computer science -Merging Concrete Art and Computer Science with the Ideas from the Bauhaus preliminary courses: - Materialize the intangible - Computer science you can touch

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	-Development of an independent idea for a preliminary course for computer science Learn how to create three-dimensional models
Contents:	In this course, students will gain an artistic and creative insight into computer science. To this end, they will deal with the following topics, among others: -3D printing and 3D scanning -Concrete Art -Bauhaus preliminary courses -Design theory -Color theory and artistic design -Digitization
Type of examination:	The examination is a term paper written in a group. Participation in the face-to-face sessions is essential for the successful completion of this paper. A preliminary examination is not required. FIN: B.Sc. WIF - WPF Verstehen & Gestalten: only graded creditable.
Media:	
Literature:	

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Module title:	Distributed Data Management
Engl. module name:	Distributed Data Management
Module level, (optional):	
Abbreviation:	DDM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Dr. Eike Schallehn
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	180h (56 h contact hours + 124 h self-study) Lectures (2 SWS) and exercises (2 SWS)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Database introduction course
Intended learning outcomes:	Comprehension of basic principles and advantages of distributed data managementCompetence to develop distributed databases Comprehension of query and transaction processing in distributed and parallel databases Competence to optimize the run-time performance and sat-isfy requirements regarding reliability and availability of distributed systems
Contents:	Overview and classification of distributed data management (distributed DBMS, parallel DBMS, fedrated DBMS, P2P)Distributed DBMS: architecture, distribution design, distributed query processing and optimization, distributed transactions, and transactional replication Parallel DBMS: fundamentals of parallel processing, types of parallelization in DBMS, parallel query processing

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The German version is legally binding

Type of examination:	Exam requirements: Participation and active involvement in the course and the exercises Examination: written (120 minutes)
Media:	
Literature:	

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The German version is legally binding

Module title:	Effiziente Programmierung und Ein-/Ausgabe
Engl. module name:	Efficient Programming and Input/Output
Module level, (optional):	
Abbreviation:	EPEA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar
Teaching method / weekly hours:	Seminar
Workload:	Attendance: 2 SWS Seminar (28h) Independent work: Working on and presenting the chosen topic, following up the presentations, preparing the written paper (122h)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic programming skills Knowledge of the basic mechanisms of operating systems (e.g. computer engineering) Basic knowledge of computer architectures as well as algorithms and data structures
Intended learning outcomes:	Participants learn to work independently on a given topic and present it to the other participants in an understandable way.
Contents:	Optimizing the use of modern computer architectures is no easy task, which is why scientists are constantly faced with new challenges when developing efficient applications. Input/output in particular is often a bottleneck. An in-depth understanding of the hardware and software environment and possible causes of performance problems is therefore essential for efficient programming. The seminar is about efficient programming and input/output in the broader sense. This includes the actual development of efficient applications as well as their debugging and performance analysis. Information on various topics will be

	researched and presented using concrete examples. For example, compiler optimizations, tools for debugging and performance analysis, approaches to data reduction as well as scientific publications on current research questions can be presented.
Type of examination:	Unit Written elaboration
Media:	
Literature:	

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The German version is legally binding

Module title:	Einführung in das Wissenschaftliche Rechnen
Engl. module name:	Introduction to Scientific Computing
Module level, (optional):	
Abbreviation:	WR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture / 2 SWS exercise Independent work: Reviewing the lecture Solving the exercises 150 h (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of linear algebra
Intended learning outcomes:	Knowledge required: Understanding of the basic tools for scientific computing (computer graphics, computer vision, machine learning, ...) Understanding of the basic concepts of linear algebra
Contents:	Computed tomography: Numerical solution of systems of equationsFace recognition: Singular value decomposition Interpolation: Animations in computer graphics Audio processing: discrete Fourier transform Nonlinear optimization: Posterize
Type of examination:	Written examination
Media:	Blackboard, slides, sample programs

Literature:	G. Strang, Linear Algebra. Berlin, Heidelberg: Springer Berlin Heidelberg, 2003.G. Strang, Wissenschaftliches Rechnen. Berlin, Heidelberg: Springer Berlin Heidelberg, 2010.

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The German version is legally binding

Module title:	Einführung in die Angewandte Ontologie
Engl. module name:	Introduction to Applied Ontology
Module level, (optional):	
Abbreviation:	IntOnt
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Theoretical Computer Science
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	weekly lecture 2SWS, weekly exercise 2 SWS Independent work: Processing the exercises and assigned problems Follow-up of the lecture In-depth study of literature 180h = 4SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to logic
Intended learning outcomes:	Understanding the logical foundations of applied ontology Understanding of basic concepts and methods of applied ontology. Overview of relevant software tools (editing/reasoning) Ability to develop simple ontologies yourself
Contents:	Ontologies represent knowledge in a machine-interpretable and human-readable form. They have important applications in the semantic web, interoperability, and intelligent systems in general. The course is an introduction to applied ontology, with a special focus on the logical foundations of ontology languages.
Type of examination:	

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	Compulsory participation in the exercises and presentation in the exercises Exam: oral
Media:	
Literature:	

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Module title:	Einführung in die Betriebswirtschaftslehre
Engl. module name:	Einführung in die Betriebswirtschaftslehre
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Entrepreneurship, Professorship for International Management
Lecturer(s):	Professorship for Entrepreneurship, Professorship for International Management
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die Digital Humanities
Engl. module name:	Introduction to Digital Humanities
Module level, (optional):	
Abbreviation:	EinfDH
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Ernesto De Luca
Lecturer(s):	Prof. Dr. Ernesto De Luca
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture
Workload:	Bachelor: 5 credit points = 150h 2 SWS = 28 hours attendance time + 122 hours independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Information retrieval, text mining, text analysis
Intended learning outcomes:	Planning and implementation of interdisciplinary projects Requirements analysis Understanding and analyzing digital processes Mastering an interdisciplinary context
Contents:	Introduction to Digital Humanities (humanities perspective) Introduction to Digital Humanities (computer science perspective) Linguistics and linguistic processing Data and knowledge representation Interdisciplinary work and communication Digital Humanities Projects: International TextbookCat / World of Children / World Views Visualization and interaction with data and knowledge
Type of examination:	Preliminary examination results will be announced at the beginning of the semester Scientific project (more details in the course) Examination also applies to Schein
Media:	
Literature:	

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The German version is legally binding

Module title:	Einführung in die Informatik
Engl. module name:	Introduction to Computer Science
Module level, (optional):	
Abbreviation:	Insert INF
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	FIN professors
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Design
Teaching method / weekly hours:	Lecture; Exercise; Tutorial
Workload:	Attendance times: 4 SWS Lecture 2 SWS Exercise 1 SWS Tutorial Independent work: Solution of exercises including tutorials and exam preparation 300 h = 7 SWS = 98 h attendance time + 202 h independent work
Credit points / ECTS:	10
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Acquisition of basic knowledge of the concepts of computer science Ability to solve algorithmic tasks and to design data structures Familiarity with the informatics way of thinking when solving problems
Contents:	Basic concepts in Java functions Object-oriented programming Programming paradigms Selected algorithms: Searching and sorting Analysis of algorithms: Correctness and complexity Basic data structures and abstract data types Predictability and decisiveness
Type of examination:	

	Exam: Written exam 120 min. Admission prerequisites: successful completion of the exercises (voting)
Media:	
Literature:	Saake/Sattler: Algorithms and Data StructuresGoodrich/Tamassia: Data Structures and Algorithms in Java Sedgewick: Algorithms

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The German version is legally binding

Module title:	Einführung in die Kommunikationstechnik
Engl. module name:	Communications technology
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for High Frequency and Communication Technology
Lecturer(s):	Prof. Dr.-Ing. Abbas Omar
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 4SWS Weekly lectures Independent work 150 h (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics, physics, fundamentals of electrical engineering
Intended learning outcomes:	Learning objectives and skills to be acquired: 1. introduction to communication technology Teaching the concepts of information, information-carrying signals, modulation, noise, transmission channels, channel capacity and source and channel coding Development of mathematical models for the treatment of the above concepts Description and quantitative treatment of information transmission systems Teaching of engineering decision bases for the design of information transmission systems 2. information and coding theory Teaching of the information theory concepts of information content, entropy, redundancy, source coding, channel capacity, channel coding, Hamming space and Hamming distance. Creation of mathematical models for the above concepts. Treatment of selected methods for source and channel coding. Treatment of selected error-correcting decoding methods.

Contents:	1. introduction to communication technology Mathematical representation of signals as information carriers in the time and frequency domain (Fourier series and Fourier transformation) Sampling theory and the digitization of signals Source coding and data compression Mathematical description of the noise Noise behavior of the transmission channels; calculation of the bit error rate Treatment of selected digital transmission systems in the baseband (PCM, DPCM, ...) Treatment of selected digital transmission systems in the passband (ASK, PSK, FSK, QAM, ...) 2. information and coding theory Information content and entropy of discrete information sources. Redundancy, memory and source coding (Shannon-Fano and Huffmann methods). Continuous sources. Discrete and continuous channels, channel entropies and channel capacity Channel coding and Hamming space Linear block codes Cyclic codes Syndrome decoding
Type of examination:	Examination
Media:	
Literature:	see script

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die medizinische Bildgebung
Engl. module name:	Introduction to Medical Imaging
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Medical Telematics
Lecturer(s):	Professorship for Medical Telematics
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: B.Sc. CV - Application Subject - Medical Technology FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture (1 SWS optional exercise) Independent work: Independent preparation and follow-up 90h = 2 SWS = 28h attendance time + 62h independent work
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Basics of image processing
Intended learning outcomes:	Learning objectives & skills to be acquired: The students are able to: indicate the most important modalities (procedures) and their areas of application (medical issues), describe the basic functioning of each modality justify the suitability of a modality for an investigation by weighing up the advantages and disadvantages, identify the technical challenges and the main disadvantages.
Contents:	Imaging is the most important form of medical diagnosis today. Choosing the right modality, weighing up the advantages and disadvantages and setting the optimum parameters is a key task. This event will provide an overview of the modalities of modern medical imaging. The principle, the mode of operation and the most important medical applications are presented and the

	advantages and disadvantages with regard to image quality and risks for the patient are discussed. Contents: X-ray fluoroscopy Computer tomography Nuclear medical imaging (PET, SPECT) Magnetic resonance imaging Ultrasound imaging
Type of examination:	Exam: written
Media:	
Literature:	H. Morneburg (ed.): Imaging systems for medical diagnostics, 3rd ed. Publicis MCD Verlag, 1995O. Dössel: Imaging procedures in medicine, Springer, 2000 R. Berger: Modern imaging techniques in medical diagnostics - a way to make physics lessons more interesting. Studies on physics learning. Volume 11 Ed. S. Webb: The Physics of Medical Imaging, Adam Hilger, Bristol, 1988

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die Systemtheorie
Engl. module name:	Introduction to systemstheory
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Systems Theory and Control Engineering
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Independent preparation and follow-up 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Students have basic skills in the observation of dynamic systems. In addition to being able to deal with simple formal concepts, they also have an intuitive understanding of basic dynamic phenomena. In the exercise, students have acquired the ability to use examples to recognize that dynamic phenomena occur in a variety of technical and non-technical application areas.
Contents:	Basic concepts of systems theory (systems, signals, static and dynamic systems)Examples of dynamic systems (geometric growth, simple population model, model of an isolated economy, exponential growth, predator-prey model, electrical network, mechanical systems)Classification of causal systems (linearity, time invariance, autonomy)Difference equations (autonomous difference equations, Autonomous linear difference equations)Differential equations (autonomous differential equations, autonomous linear differential equations)Control and regulation (state space, controllability, stabilization by regulation)Elements of linear algebra (vectors and matrices, vector and matrix operations, basis vectors and

	coordinate systems, change of coordinate system, eigenvalues and eigenvectors)
Type of examination:	Exam: written (120 min)
Media:	
Literature:	1] J. Lunze: Regelungstechnik I, Systemtheoretische Grundlagen, Analyse und Entwurf einschleifiger Regelungen, Springer [2] B. Girod, R. Rabenstein, A. Stenger: Einführung in die Systemtheorie, Signale und Systeme in der Elektrotechnik und Informationstechnik, Teubner [3] R. Unbehauen: Systemtheorie I, Allgemeine Grundlagen, Signale und lineare Systeme im Zeit-und Frequenzbereich, Oldenbourg

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die Verfahrenstechnik
Engl. module name:	Einführung in die Verfahrenstechnik
Module level, (optional):	
Abbreviation:	EinfVT
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Dr. Hanke-Rauschenbach, Max Planck Institute; Jun.-Prof. Metzger, Institute of Process Engineering
Lecturer(s):	Dr. Hanke-Rauschenbach, Junior Prof. Metzger
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Process Engineering
Teaching method / weekly hours:	Lecture
Workload:	1 SWS Lecture
Credit points / ECTS:	-
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Initial knowledge of issues, tools and areas of application in process engineering
Contents:	1 What is process engineering? 2. detergents, surfactants and pharmaceuticals 3. basics of modeling and simulation of process engineering processes - What does a computer scientist have to do with process engineering? 4. paragraph-by-paragraph distillation - from fruit to schnapps "Mixing Impossible" - Monte Carlo simulation with water, oil and soap Models of solids process engineering - SolidSim, pore networks, discrete element method "Computer science meets process engineering" ProMoT - object-oriented modeling tool
Type of examination:	none
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die Volkswirtschaftslehre
Engl. module name:	Einführung in die Volkswirtschaftslehre
Module level, (optional):	
Abbreviation:	EVWL
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Economic Policy (VWL3), FWW
Lecturer(s):	Dr. S. Hoffmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - Understanding
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Einführung in die Wirtschaftsinformatik
Engl. module name:	Business Informatics (Introduction)
Module level, (optional):	
Abbreviation:	EWIF
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Prof. Klaus Turowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science BSc KWL, compulsory subject, WI 1.1
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 28h Lecture 28h Exercise Independent work: Preparation and follow-up of the lecture Development of solutions in the exercise 150h Lecture 2 SWS = 28h attendance time + 62h independent work Exercise 2 SWS = 28h attendance time + 32h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Creating a basic understanding of business informatics as a specialist discipline and scienceLearning the basic concepts of business informatics Acquisition of broad knowledge of the various specialist areas of business informatics Acquisition of programming techniques for individual data processing
Contents:	Definition and classification of business informaticsProfessional profiles for business informatics specialists Business informatics as a science Basic concepts of business informatics Requirements management Modeling of business structures and processes Development of business problem solutions with end-user tools

Type of examination:	Preliminary work as specified at the beginning of the semester Written examination, 120 min
Media:	
Literature:	Encyclopedia of Information Systems (http://www.enzyklopaedie-der-wirtschaftsinformatik.de/)

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The German version is legally binding

Module title:	Einführung in die Wissensrepräsentation
Engl. module name:	Introduction to knowledge representation
Module level, (optional):	
Abbreviation:	KR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Fabian Neuhaus
Lecturer(s):	Dr. Fabian Neuhaus
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + 2 SWS exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 6 CP= 56h attendance time+124h independent work
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Successful completion of the "Logic" module or sound knowledge of the topics covered in the "Logic" module.
Intended learning outcomes:	Understanding of the basic concepts and methods of knowledge representationUnderstanding of the logical foundations of the languages relevant for ontologies and knowledge graphsAbility to develop simple knowledge bases yourself
Contents:	In this module, students are introduced to the basics of knowledge representation. This is done using the example of

	technologies used for the representation of knowledge in the form of knowledge graphs and ontologies. The intended learning outcomes include: (a) an understanding of the theoretical foundations of knowledge representation, (b) knowledge of important languages, methods and tools used in practice to represent knowledge and (c) the ability to develop simple knowledge graphs and ontologies themselves. This module covers the following topics: Theoretical foundations of knowledge representation and formal semanticsResource Description Framework (RDF): a language for knowledge graphs Resource Description Framework Schema (RDFS): a language for simple controlled vocabularies and taxonomiesSPARQL Protocol and RDF Query Language: a query language for RDF(S) graphsWeb Ontology Language (OWL): a language for applied ontologiesMethods for developing knowledge graphs and ontologies Examples of how knowledge graphs and ontologies are used in practice
Type of examination:	Admission prerequisites: regular participation in lecture and exercise, successful completion of the exercises Form of examination: oral
Media:	
Literature:	

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The German version is legally binding

Module title:	Einführung in Digitale Spiele
Engl. module name:	Introduction to Digital Games
Module level, (optional):	
Abbreviation:	EiDS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Holger Theisel
Lecturer(s):	Junior Professor Alexander Dockhorn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 hours: 2 hours lecture + 2 hours exercise = 56 hours + 94 hours self-study and practical work on a prototype and its presentation
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Students should understand the content design of games from a systematic point of view. They will be familiar with the main work processes in the games industry and how they are structured. During the course, they will gain a first impression of the technical complexity of a game. They receive an initial overview of the conception and development of computer games and are encouraged to develop their own ideas for games and implement them in the form of a prototype. Students are familiar with the software architecture of computer games and are able to make cross-references to other areas of computer science. They learn about the most important components of an engine in the context of their theoretical foundations and their practical use. Mathematical fundamentals are first consolidated and then the functionality of a game engine and its core components are explained. Students should gain a conceptual understanding of the components and apply them during the development of a prototype.
Contents:	Game DesignGame Development Software Patterns2D-3D Math Game ConceptsCameras, Rendering, AnimationsLights,

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	Shadows, ShadersPhysical Engines, CollisionsAudio EnginePathfinding, Steering, NavigationProcedural Content GenerationGame AIPrototyping, Playtesting, Publishing
Type of examination:	Completion of exercises and their presentationCreation of a prototype and its presentation
Media:	
Literature:	Gregory, J. (2018). Game Engine Architecture (3rd ed.). CRCShell, J. (2014). The Art of game Design A Book of Lenses. CRCSteve Rabin: "Introduction to Game Development", Charles River Media, 2010Thomas Akenine-Möller, Eric Haines, Naty Hoffman: "Real Time Rendering", Peters, 2008Unity Learn: https://learn.unity.com

English courtesy translation.
The German version is legally binding

Module title:	Einführung in Managementinformationssysteme
Engl. module name:	Introduction to management information systems
Module level, (optional):	
Abbreviation:	EinfMIS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Prof. H.-K. Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Apply FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area WPF WLO-B.Sc. from 5th semester (module 4 CP)
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Lecture preparation and follow-up Development of solutions in and for the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	none
Recommended prerequisites:	Introduction to business informatics
Intended learning outcomes:	Learning objectives & skills to be acquired: - Understanding the concept of management systems for all types of organizations - Understanding management information systems as the information technology equivalent of management systems - Application of a methodical approach to the development of management information systems - Use of meta information and application integration in management information systems
Contents:	Basics of management systems

	Management information systems as information systems for management systems Methods for the conception and realization of management information systems Meta information in management information systems
Type of examination:	Successful completion of the semester assignment enables students to take the examination. Examination: written examination (written exam) in the summer semester
Media:	
Literature:	See http://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module title:	Electronic System Level Modeling
Engl. module name:	Electronic System Level Modeling
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, bi-weekly exercises 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 3 SWS / 6 credit points = 180 h (42 h attendance time + 138 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science, basic knowledge of C/C++
Intended learning outcomes:	Learning objectives & skills to be acquired: After successfully completing the module, students should be able to independently design complex system descriptions with SystemC. They will be able to select the appropriate modeling style for a given problem and gradually refine models from the transaction level to the register transfer level. Students will be able to explain how the SystemC simulation kernel works, provide a comprehensive overview of the classes available in SystemC and use them appropriately. They will also be able to discuss current problems in system design and common modeling concepts. Through practical exercises, students are able to deepen their knowledge and skills in a research-oriented manner and to apply and evaluate them in complex problems.
Contents:	Modeling concepts for complex systemsModeling languages Introduction SystemC Register transfer level modeling with SystemC Simulation algorithm Transcation level modeling with SystemC

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	Modeling of temporal processes High-level synthesis
Type of examination:	Oral examination
Media:	
Literature:	

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The German version is legally binding

Module title:	Elektrische Antriebe I (Elektrische Antriebssysteme I)
Engl. module name:	Electrical drives 1
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	
Module coordinator:	Professorship for Electrical Drives
Lecturer(s):	Prof. Dr.-Ing. habil. Frank Palis
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: Winter semester 2 SWS Lecture 1 SWS exercise Summer semester 1 SWS Internship Independent work: Exercise preparation 150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of electrical machines and actuators, power electronics, control and regulation technology
Intended learning outcomes:	Learning objectives and skills to be acquired: Selection of the structure of electric drive systems according to the requirements of the machines and technological processes with the aim of optimizing energy use and dimensioning the required assembly Implementation of motion processes in machines and systems in accordance with energy, technological and automation requirements
Contents:	Tasks and structure of an electric drive system, Characteristics of movement processes, Mechanics of the drive system (equation of motion and description of the motion variables), typical resistance-torque characteristics of working machines, starting and braking of a

	drive system, stable operating point, the mechanical transmission system), steady-state and dynamic behavior of selected electrical machines (DC shunt-wound machines, asynchronous machines with slip ring and squirrel-cage rotors, synchronous machines), structures of binary-controlled drive systems with asynchronous machines for starting, braking and speed control, control structures of speed- and position-controlled electrical drive systems
Type of examination:	Achievements: Compulsory participation in the exercises, successful completion of the laboratory practical (certificate) Exam: written (90 min)
Media:	
Literature:	U. Riefenstahl: Elektrische Antriebssysteme, B.G.Teubner Verlag Stuttgart, Leipzig 2000, 2006 D. Schröder: Elektrische Antriebe, Vol.1-4, Springer-Verlag, Berlin, Heidelberg, 1994, 2001 W. Leonhard: Control of Electrical Drives. Springer-Verlag, Berlin, Heidelberg, New York, 1996

English courtesy translation.
The German version is legally binding

Module title:	Elektrische Antriebe II
Engl. module name:	Elektrische Antriebe II
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr.-Ing. habil. Frank Palis (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. habil. Frank Palis (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	3SWS = 150h (42h attendance time + 108h independent work) Attendance times: weekly lectures 2 SWS, weekly exercises 1 SWS, independent work: Follow-up of the lecture, solving the exercises
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Electrical machines Electric drives I Control engineering
Intended learning outcomes:	Learning objectives and skills to be acquired Imparting basic knowledge of the system behavior and application of electric drives Teaching skills for the integration of electrical drives in complex mechanical systems
Contents:	Selection of electrical machinesDetermination of the type output of electrical machines Motor protection Power electronic actuators for electric drives Power electronic actuators for DC drives Converter-fed direct current drives Converter-fed three-phase drives
Type of examination:	Exam: oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

English courtesy translation.
The German version is legally binding

Module title:	Elektrische Energienetze II - Energieversorgung
Engl. module name:	Elektrische Energienetze II - Energieversorgung
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	3 SWS = 150h (42h attendance time +108h independent work) Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Control engineering, control technology, discrete-event systems
Intended learning outcomes:	Learning objectives and acquired skills: Providing in-depth knowledge in the field of energy transmission and distribution Providing in-depth knowledge of grid planning, grid operation, grid control and grid services Acquisition of specialized knowledge on problems of grid monitoring, grid security, black-out prevention and grid integration of central generators.
Contents:	Grid planning and grid operationGrid control, parallel operation of generators Network services Network monitoring through synchronous measurements Dynamic Security Assessment Black-out prevention Wind farm modeling and model reduction Organization of the energy industry Balancing groups and transmission grid operation Cost accounting in the energy industry Reliability calculation in the energy grid

Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Embedded Bildverarbeitung
Engl. module name:	Embedded image processing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	
Module coordinator:	Professorship for Computer Engineering
Lecturer(s):	Professorship for Computer Engineering
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. INGINF - Engineering Informatics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercise preparation 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Hardware-related computer architecture, image processing
Intended learning outcomes:	Learning objectives & skills to be acquired: The lecture imparts knowledge of embedded image processing solutions and is closely related to the corresponding hardware and software as well as image processing algorithms. The aim is to teach skills for the development and use of such embedded systems.
Contents:	Information flow in an image processing system Compact systems Special hardware Signal processors SIMD computer on a chip Hardware/ Software Codesign Applications Cameras with integrated controller Stereo head Robotics Driver assistance systems (examples)

	Algorithms and their modification for applications Kalman filter and sensor fusion with other variables Application perspectives
Type of examination:	Exam: oral
Media:	
Literature:	see script

English courtesy translation.
The German version is legally binding

Module title:	English TopUp BiBa
Engl. module name:	English TopUp BiBa
Module level, (optional):	
Abbreviation:	Engl-TopUp
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Start every winter semester, over 4 semesters
Module coordinator:	Dr. Claudia Krull
Lecturer(s):	Language Center
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - Language
Teaching method / weekly hours:	Lecture; Exercise; Seminar
Workload:	8 SWS spread over 4 semesters, 2 SWS per semester
Credit points / ECTS:	8-10 CP (depending on whether extra services are provided)
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Refresher course in English starting from B2 Abitur level with a focus on academic soft skills and technical language
Contents:	communicaCommunication Cultural Studies, Media Literacy Critical Thinking Presentation Skills
Type of examination:	partially graded
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Entdecken häufiger Muster
Engl. module name:	Frequent pattern mining
Module level, (optional):	
Abbreviation:	FPM
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	
Module coordinator:	PD Dr.-Ing habil. Christian Borgelt
Lecturer(s):	PD Dr.-Ing habil. Christian Borgelt
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science For release / assignment to curricula of interdisciplinary degree programs and degree programs outside the FIN, see study documents of the respective degree program
Teaching method / weekly hours:	Lecture; exercise; block course
Workload:	Attendance times: 2 SWS lecture + 2 SWS exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final examination180h = 4 SWS = 40h attendance time + 140h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures Basics of: Data Mining
Intended learning outcomes:	Learning objectives & acquired skills: Knowledge of basic algorithm schemes and standard algorithms for finding frequent patterns in sets Understanding of the necessary efficient data structures and processing methods

	Insight into the special problems of analyzing structured data (sequences, trees, general graphs) and possible solutions Ability to select a suitable process depending on the application problem Ability to develop specialized algorithms to find common patterns Dealing with literature on the subject area
Contents:	Finding frequent subsets (frequent item set mining) and association rulesFinding frequent subsequences (for discrete and interval data) Finding frequent subtrees and graphs Efficient basic algorithms and data structures Avoidance of redundant searches when analyzing structured data, especially with the help of canonical forms of the patterns to be discovered Approaches for evaluating and filtering patterns found Extensions to the basic algorithms for special applications Application examples, especially for the discovery of frequent subgraphs
Type of examination:	Exam: oral
Media:	
Literature:	Mainly scientific articles, see FPM website

English courtesy translation.
The German version is legally binding

Module title:	Entwurf und Simulation von Mikrosystemen
Engl. module name:	Entwurf und Simulation von Mikrosystemen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. rer. nat. Bertram Schmidt (FEIT-IMOS)
Lecturer(s):	Prof. Dr. rer. nat. Bertram Schmidt (FEIT-IMOS)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	SWS = 240h (70h attendance time +170h independent work) Attendance times: Lecture 2 SWS, exercise 1 SWS, laboratory practical 2 SWS Independent work: Solving exercises, preparing for practical training, preparing a presentation, preparing for exams
Credit points / ECTS:	8
Mandatory prerequisites :	
Recommended prerequisites:	Compulsory module Bachelor ETIT "Introduction to Microsystems Technology" Compulsory elective module Bachelor "Discrete Methods of System Simulation" Compulsory elective module Bachelor "Materials in Electrical and Computer Engineering"
Intended learning outcomes:	Learning objectives: Basic knowledge of mechanical properties and failure criteria for microcomponents Knowledge of simulation methods (FEM, system simulation) and CAD tools Acquired competencies: Linking technology, CAD design and simulation Use of simulation and CAD tools for the manufacture of a micro-component This develops skills for solving specific tasks in the field of design and simulation for microsystems.
Contents:	Scaling effects and key figuresMicrosystem design Piezoresistive sensors Finite element methods (FEM)

	System design with VHDL-AMS Design with CAD tools Design rules using the MUMPS process as an example Multilayer adjustment, overlay
Type of examination:	Oral examination, presentation
Media:	
Literature:	

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The German version is legally binding

Module title:	Entwurf, Organisation und Durchführung eines Programmierwettbewerbs
Engl. module name:	Entwurf, Organisation und Durchführung eines Programmierwettbewerbs
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Dr. Christian Rössl
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Software project FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - Software project FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - Software project FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - Design FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: B.Sc. WIF - Key and methodological skills - Software project
Teaching method / weekly hours:	Project
Workload:	150 hours of independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Acquisition of advanced knowledge in the field of interactive systems, especially computer gamesAcquisition of practical experience in the design and implementation of software systems, working and communicating in a team, supervising "users", automated evaluation of results if possible
Contents:	The participants design and organize the programming competition for the lecture "Algorithms and Data Structures", which is typically a computer game. For this purpose, a scenario is designed for the competition in which the competition participants (as "users") have to solve algorithmic tasks. This scenario is implemented in a framework with defined interfaces, exemplary solutions, documentation and instructions as well as the possibility of automatic ("offline") evaluation of results. The participants organize the actual competition and the evaluation independently.

Type of examination:	Prerequisite: Completion of the programming competition, examination: scientific project, also possible as a certificate
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Erziehungswissenschaft: Interaktive Medien als sozial-kulturelle Phänomene
Engl. module name:	Educational Science: Interactive media as socio-cultural phenomena
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Educational Media Research
Lecturer(s):	Professorship for Educational Media Research
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Educational Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: 2 SWS Seminar Independent work Prepare presentation Create a media product or term paper 5 x 30h (28 h attendance time + 122 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: The module aims to impart basic knowledge about the social and cultural relevance of interactive media (e.g. computer games). On the one hand, students should be able to analyze and evaluate different types of game and edutainment software. On the other hand, they should get to know and assess approaches to explain the fascination and possible risks of using selected interactive media. This includes empirical and theoretical analyses of social and cultural phenomena in the context of computer games (offline and online)
Contents:	Use and distribution of interactive mediaSubjective importance of interactive media and motives for media use Social-cultural contexts of the use of interactive media Methods of analyzing and evaluating interactive media Content analysis of video and computer games Computer games between fascination and risk Basics, opportunities, problems of youth media protection Convergence phenomena in the field of (new) media

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The German version is legally binding

Type of examination:	Academic achievements: Presentation, term paper or media product Total number of credits for the module: 5
Media:	
Literature:	

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The German version is legally binding

Module title:	Estimation for Autonomous Mobile Robots
Engl. module name:	Estimation for Autonomous Mobile Robots
Module level, (optional):	
Abbreviation:	AMR
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Benjamin Noack
Lecturer(s):	Prof. Benjamin Noack
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. VC - Visual Computing - Electives
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercise Independent work: Follow-up study, working on exercises 180 h = 56 h attendance time + 124 h independent work
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Linear Algebra, Analysis
Intended learning outcomes:	You have an overview of basic problems and methods in parameter and state estimation for mobile systems.You understand how to develop kinematic models for mobile robots and how to derive discrete-time prediction models.You are familiar with the required mathematical tools and can derive and apply least-squares methods for localization and tracking of mobile systems, e.g., based on distance measurements.You have a good understanding of Kalman filtering and its nonlinear generalizations for dynamic state estimation and localization of mobile systems.

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Contents:	Kinematics, System Models, and Dead Reckoning for Mobile SystemsSensor Models and Optimization Methods for Localization and TrackingDynamic State Estimation for Real-Time Localization and TrackingLinear Kalman Filtering and Nonlinear Generalizations
Type of examination:	Oral examination
Media:	Digital Notes, Exercise Sheets
Literature:	Literature will be announced in the lecture

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The German version is legally binding

Module title:	Ethische Herausforderungen im Digitalen Zeitalter
Engl. module name:	Ethical challenges in the digital era
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Karl Teille, Volkswagen AutoUni, Head of the Institute for Information Technology
Lecturer(s):	Dr. Karl Teille, Volkswagen AutoUni, Head of the Institute for Information Technology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science Key and methodological skills - Scientific seminar
Teaching method / weekly hours:	Lecture
Workload:	Lecture
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Good knowledge of at least one programming language, VL operating systems, willingness for interdisciplinary work
Intended learning outcomes:	Recognize ethics as a philosophical disciplineBe able to classify questions of ethics Understanding aspects of digitalization as an ethical challenge
Contents:	Definition of ethics Descriptive ethics Justification of ethics Teleological ethics

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	Deontological ethics Opportunities of digitalization Barriers to the commercial usability of data Ethical challenges in dealing with personal data / metadata Expanding the concept of reality Artificial intelligence and technological singularity Areas of application for digitization SalesMobility (autonomous driving; smart cars)Autonomous decisions by machinesIntelligent, networked production, Industry 4.0Autonomous warfare
Type of examination:	Oral examination
Media:	
Literature:	Baumgartner, C.: Digitalization is happening. Interview with August-Wilhelm Scheer. In Computerwelt, 2015, 2015; p. 4. Brantl, S. : Business ethics. Article in Gabler Wirtschafts-Lexikon. Gabler, Wiesbaden, 1988. Federal Constitutional Court, of December 15, 1983, file number 1 BvR 209, 269, 362, 420, 440, 484/83, "Volkszählungsurteil", quoted from [Fili15, p.10] Filipovic, A.: Die Datafizierung der Welt - Eine ethische Vermessung des digitalen Wandels. Communicatio Socialis, 48 Jg. 2015, H.1 Frey, C. B.; Osborne, M.: Technology at Work - The future of innovation and employment. In Citi GPS: Global Perspectives & Solutions, 2015. Hausmanninger, Th./ Capurro, R. (2002): A series of publications introduces itself. In Hausmanninger, Th./ Capurro, R. (eds.): Netzethik. Fundamental questions of Internet ethics. Munich, pp.7-12; quoted from [Fili15, p. 7] Kurz, C.; Rieger, F.: Arbeitsfrei. A voyage of discovery to the machines that are replacing us. Goldmann Verlag, Munich, 2015. no author: Playing on the highway. Autonomous driving is the big topic for car manufacturers. In ADAC Motorwelt, 2015; p. 10. Reitz, M.: Norbert Wiener - founder of cybernetics. SWR2 Wissen, March 17, 2014 Schwägerl, C.: Offline is so over. The internet is getting even closer. In Zeit online, 03.05.2015. Simanowski, R.: Data Love. Matthes & Seitz, Berlin, 2014. Vack, P.: Self-Drive Cars and You: A History Longer than You Think. VeloceToday.com - The Online Magazine for Italian and French Classic Car Enthusiasts. http://www.velocetoday.com/self-drive-cars-and-you-a-history-longer-than-you-think/, 03.05.2015. Watzlawick, P.: How real is reality? Delusion, deception, understanding. Piper, Munich, Zurich, 2005. Zeit Online GmbH: Research project: The 1-billion-euro brain. http://www.zeit.de/2011/21/Kuenstliches-Gehirn, 08.05.2015.

English courtesy translation.
The German version is legally binding

Module title:	Eudaimonic Interaction Design
Engl. module name:	Eudaimonic Interaction Design
Module level, (optional):	
Abbreviation:	EID
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Ernesto William De Luca
Lecturer(s):	Prof. Dr.-Ing. Ernesto William De Luca, Julian Marvin Jörs
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: weekly block seminar Independent work: 94 hours of independent work (working on exercises; follow-up of the lecture, preparation for the exam) Project for Master students: 30h work on one of the proposed projects in HCNLP Master 180h = 56h (4 SWS) attendance time + 94h independent work + 30h project work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	Services: - Processing the exercises; - Processing the programming tasks; - Successful presentation of the project results. Written examination (also for Schein). Preliminary work as specified at the beginning of the semester.
Media:	

Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Evolutionäre Algorithmen
Engl. module name:	Evolutionäre Algorithmen
Module level, (optional):	
Abbreviation:	EA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	
Module coordinator:	Intelligent systems
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercises Independent work: Work on exercises and programming tasks 150 h = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Programming language Java or similar Algorithms and data structures Programming, modeling Mathematics I to IV
Intended learning outcomes:	Application of adequate modeling techniques for the design of evolutionary algorithmsApplication of numerical optimization methods for problem solving Evaluation and application of evolutionary programming for the analysis of complex systems Ability to develop evolutionary algorithms
Contents:	Brief introduction to biological principles of evolution and geneticsDesign of genetic operators (e.g. selection, crossover, recombination, mutation) Overview of different types of genetic and evolutionary algorithms and genetic programming

	Explanation of the advantages and disadvantages of these algorithms using examples Treatment of related processes (e.g. simulated annealing) Application examples
Type of examination:	Examination in written form, duration: 120 min. Required preliminary work: Completion of at least two thirds of all exercises in the semester Successful presentation of two Exercises Appearance, required preliminary work: Successful completion of a programming task on the topic of the lecture (work in groups of one or two students) including design, implementation, test, documentation and handover, e.g. EA to solve a board or card game Successful participation in the examination (for a non-graded certificate, a minimum grade of 4 must be achieved) Regardless of the type of coursework/examination, regular and active participation in lectures and exercises is required.
Media:	
Literature:	Richard Dawkins. The Selfish Gene. Oxford University Press, Oxford, UK, 1990 (German edition: "Das egoistische Gen". Rowohlt, Hamburg, 1996)Richard Dawkins. The Blind Watchmaker. Penguin Books, London, UK, 1996. (German edition: "Der blinde Uhrmacher". dtv, Munich, 1996) Ines Gerdes, Frank Klawonn, Rudolf Kruse. Evolutionary algorithms. Vieweg Verlag, Wiesbaden, 2004. Zbigniew Michalewic. Genetic Algorithms + Data Structures = Evolution Programs. Springer Verlag, Berlin, 1998. Volker Nissen. Introduction to evolutionary algorithms. Optimization based on the model of evolution. Vieweg Verlag, Braunschweig / Wiesbaden, 1997.

Module title:	Evolutionary Multi-Objective Optimization
Engl. module name:	Evolutionary Multi-Objective Optimization
Module level, (optional):	
Abbreviation:	EMO
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Computational Intelligence
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: - 2 SWS Lecture - 2 SWS Exercises Independent work: - Working on exercises
Credit points / ECTS:	6 credit points for Master students = 180 h = 56 h attendance time + 124 h independent work
Mandatory prerequisites :	
Recommended prerequisites:	Intelligent systems, optimization algorithms, the basis of evolutionary algorithms
Intended learning outcomes:	- Application of computational intelligence methods for Problem solving in multi-criteria optimization - Ability to develop the algorithms - Sound knowledge in the field of multi-criteria optimization
Contents:	In our daily lives we are inevitably involved in optimization. How to get to the university in the least time is a simple optimization problem that we encounter every morning. Just looking around ourselves we can see many examples of optimization problems even with conflicting objectives and higher complexities. It is natural to want everything to be as good as possible, in other words optimal. The difficulty arises when there are conflicts between different goals and objectives. Indeed, there are many real-world optimization problems with multiple conflicting objectives in science and industry, which are of great complexity. We call them Multi-objective Optimization Problems.

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The German version is legally binding

	Over the past decade, lots of new ideas have been investigated and studied to solve such optimization problems as any new development in optimization which can lead to a better solution of a particular problem is of considerable value to science and industry. Among these methods, evolutionary algorithms are shown to be quite successful and have been applied to many applications. This course addresses the basic and advanced topics in the area of evolutionary multi-objective optimization and contains the following content: - Introduction to single-objective optimization (SO) and multiobjective optimization (MO), classical methods for solving MO, definitions of Pareto-optimality and other theoretical foundations for MO - Basics of evolutionary algorithms (algorithms, operators, selection mechanisms, coding and representations) - Evolutionary multi-objective algorithms (NSGA-II, EMO scalarization methods such as MOEA/D) - Large-scale EMO: large scale decision space and many objective optimization (such as NSGA-III) - Constraint handling in SO and MO, robust optimization in EMO, surrogate methods for expensive function evaluations - Dynamic EMO - Evaluation mechanisms (Design of experiments, test problems, metrics, visualization)
Type of examination:	To pass the examination or obtain a certificate, the following requirements must be met: - Regular attendance and participation in lectures and exercises - Acquisition of the admission requirements for the written exam - Passing the written exam, 120 min. The admission requirements can consist of various elements, e.g. solving and presenting exercises or passing an intermediate exam in the semester. The exact admission requirements will be announced at the beginning of the lecture, at the latest by the end of the third week of lectures, on the chair's website.
Media:	
Literature:	- Deb, Kalyanmoy. Multi-Objective Optimization Using Evolutionary Algorithms, Wiley, 2001. - Coello, Carlos A. Coello, Gary B. Lamont, and David A. Van Veldhuizen. Evolutionary algorithms for solving multi-objective problems. Vol. 5, New York: Springer, 2007. - Miettinen, Kaisa. Nonlinear multiobjective optimization. Vol. 12 Springer Science & Business Media, 2012. - Ehrgott, Matthias. Multicriteria optimization. Vol. 491 Springer

	Science & Business Media, 2005. - Kruse, Rudolf, et al. Computational intelligence: a methodological introduction. Springer, 2016.

English courtesy translation.
The German version is legally binding

Module title:	Experimentelle Ansätze in der neurobiologischen Lernforschung
Engl. module name:	Experimental approaches for learning research in neurobiology
Module level, (optional):	
Abbreviation:	LiN
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Winter semester
Module coordinator:	A. Brechmann
Lecturer(s):	A. Brechmann, M. Deliano, R. König, A. Schulz
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: 1 SWS Lecture 30 h project Preparation and follow-up of the lecture material 120h = 44h attendance time + 76h independent work
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	Participation in the General Psychology II lecture
Intended learning outcomes:	Learning objectives & skills to be acquired: Possibilities and limitations of current methods of neurobiological learning research on humans and animals. Basic knowledge of reinforcement models, category and sequence learning, working memory.
Contents:	Methodological approaches in neurobiological learning research using fMRI, MEG, EEG and electrophysiology are taught on the basis of current research projects at the Leibniz Institute. Research paradigms are developed, tested in pilot experiments and insights into data analysis and interpretation are provided.
Type of examination:	Exam: Presentation
Media:	
Literature:	see https://iwebdav.ifn-magdeburg.de/iwebdav/LearningAndMemorySeminar/

English courtesy translation.
The German version is legally binding

Module title:	Fabrikplanung (Factory Operations)
Engl. module name:	Fabrikplanung (Factory Operations)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Kühnle, FMB-IAF
Lecturer(s):	Prof. Kühnle, FMB-IAF
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering Compulsory elective: B-MB B-WMB B. Sc. LA, B-T B. Sc. LS, B-T B. Sc. LG, B-T others by arrangement / interaction with other modules: Manufacturing theory Fundamentals of ergonomics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture; 1 SWS exercise Independent work: Accompanying self-study Exam preparation
Credit points / ECTS:	4
Mandatory prerequisites :	Cf. information in the introductory lecture
Recommended prerequisites:	
Intended learning outcomes:	Mastering a systemic approach to industrial factory processesAchieving a holistic understanding of factory processes with the help of an explication model for different situations and planning cases Assessment of methods and procedures in the subject area "Factory Operations" with regard to areas of application and practical suitability
Contents:	Basic concepts for planning and designing industrial processesSelection procedures for basic technologies in the processing industry and their areas of application Analysis and evaluation of information processes in industrial production

	Factory processes from an economic perspective, cost functions as an evaluation tool Structure and process organization of industrial production Strategic corporate planning procedures and their impact on production programs and factory structures
Type of examination:	Exercise certificate (internal examination requirement) Written examination (written exam)
Media:	
Literature:	

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The German version is legally binding

Module title:	Fertigungsplanung
Engl. module name:	Manufacturing planning
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. WEngl.er, FMB-IFQ
Lecturer(s):	Dr. WEngl.er, FMB-IFQ
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization M-MB, M-WMB Engineering Informatics, Teaching degree for vocational schools
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, independent work: Preparation and follow-up of lectures, literature study
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Recommended: Basic knowledge of manufacturing theory (production processes, measurement technology, management)
Intended learning outcomes:	Learning objectives and skills to be acquired After completing the course, the student will be able to design the production steps for typical machine components, starting with the selection of raw parts and determining the technological bases. They will have knowledge of the sequence of assembly and disassembly procedures and how to integrate quality assurance measures into the production process.
Contents:	Fundamentals of production planningProduct variants Surfaces on the workpiece, technological bases, clamping devices Part processing sequences with and without heat treatment Assembly and disassembly of components and products Quality management and test planning
Type of examination:	Exam: Written exam (90min)
Media:	
Literature:	

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The German version is legally binding

Module title:	Filmseminar Informatik und Ethik
Engl. module name:	Film Seminar - Computer Science and Ethics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Gunter Saake
Lecturer(s):	Dr. Eike Schallehn
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science Students FHW according to the PO there
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: 2 SWS Seminar Independent work: Presentation of the films Working through the topic Preparation of a presentation 90h (28h attendance time + 62h independent work)
Credit points / ECTS:	4 - 6 CP, by arrangement
Mandatory prerequisites :	
Recommended prerequisites:	Extensive knowledge of the fundamentals and applications of information systems
Intended learning outcomes:	Learning objectives & acquired skills: Independent development of a challenging topic Oral presentation of a challenging topic Understanding the ethics of the use of information technologies
Contents:	Discussion of questions relating to the ethics of information technology applications, such as Restriction of personal rights Social effects Ethical issues of specific applications (e.g. military, genetic engineering, etc.) Security and trustworthiness of systems using the example of predetermined and self-selected feature films

Type of examination:	Cumulative examination: Presentation and discussion
Media:	Powerpoint, blackboard, video, film presentation
Literature:	Independent research and literature provided

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Module title:	Finite-Element-Methode
Engl. module name:	Finite-Element-Methode
Module level, (optional):	
Abbreviation:	FEM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. U. Gabbert
Lecturer(s):	Prof. U. Gabbert
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists No interactions with other modules
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 4 hours per week (lecture, exercise, practical course); independent. Working on a project
Credit points / ECTS:	5
Mandatory prerequisites :	TM, numerical mechanics and FEM
Recommended prerequisites:	
Intended learning outcomes:	This course enables students to use the finite element method as an approximation method for solving practical engineering problems (mechanical engineering, automotive engineering, machine tool construction, aerospace). The course focuses on problems of the mechanics of solid bodies using three-dimensional models (volume and shell models). The most important theoretical principles for understanding modeling and evaluating the results (error analysis, network adaptation) are taught in the lectures. In the exercises, the material is deepened on the basis of practical tasks; in the practical course, students solve a more complex task independently, the successful completion of which is a prerequisite for admission to the examination.
Contents:	Introduction to the course (including an overview of commercial software tools) Problem-adapted modeling with volume and shell elements (shell vs. 3D continuum models) Finite volume elements (approach functions, isoparametric element concept, numerical integration, locking and hourglass phenomena, superconvergence)

	Finite shell elements (Ahmad elements, Kirchhoff and Mindlin elements, discrete Kirchhoff elements, patch test, element selection) Coupling of shell elements with 3D solid elements (constraints, weak form of coupling) Structural dynamics calculations (eigenvalues, model reduction according to Gyan and Craig-Bampton, modal methods, time integration, frequency domain methods, model updating). Overview of the FEM for solving general (coupled) field problems (heat conduction, thermal stresses). Summary and outlook (non-linear FEM, optimization) Independent processing of an individual project (group project)
Type of examination:	Oral examination
Media:	
Literature:	

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The German version is legally binding

Module title:	Flow Visualization
Engl. module name:	Flow Visualization
Module level, (optional):	
Abbreviation:	FlowVis
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times Lecture: 2h weekly Exercise: 2h weekly Independent work Homework Programming example models Self-study 180h (56h attendance time + 124h self-study)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Computer Graphics I
Intended learning outcomes:	Learning objectives & acquired skills: Participants acquire knowledge of the most important methods of flow visualization Some procedures are implemented and evaluated independently in the exercises The participants are able to visually analyze simple flow data independently with the help of existing or self-designed tools.
Contents:	Mathematical principles of vector and tensor fieldsGeneration of flow data Direct methods for flow visualization

	Texture-based methods for flow visualization Geometry-based methods for flow visualization Feature-based methods for flow visualization Topological methods for flow visualization Visualization of tensor fields
Type of examination:	Examination prerequisite: see lecture Exam: oral
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Fortgeschrittene Methoden der Medizinischen Bildanalyse
Engl. module name:	Advanced Methods in Medical Image Analysis
Module level, (optional):	
Abbreviation:	FMBA
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Professorship of Practical Computer Science / Image Processing, Image Understanding
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Project
Workload:	Attendance times: weekly lectures: 2 SWS Fortnightly project meetings: 2 SWS Independent work: Project preparation and implementation in small working groups Preparation of a project presentation Preparation and follow-up of the lecture material 180h (56h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of linear algebra, basics of image processing
Intended learning outcomes:	Learning objectives & skills to be acquired: Competence in algorithmic solutions for advanced topics of image analysis in the radiological-medical environment Ability to carry out projects in the processing of digital, radiological or nuclear medicine images Ability to present and defend own work results
Contents:	Advanced segmentation methods:

	Level Set Segmentation Graph Cut Segmentation Models of shape and texture
Type of examination:	Preliminary performance is required. Exam: oral
Media:	
Literature:	http://wwwisg.cs.uni-magdeburg.de/bv/

English courtesy translation.
The German version is legally binding

Module title:	Funktionale Programmierung - fortgeschrittene Konzepte und Anwendungen
Engl. module name:	Functional Programming - advanced concepts and applications
Module level, (optional):	
Abbreviation:	FP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Till Mossakowski
Lecturer(s):	Prof. Dr. Till Mossakowski
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Bachelor: 150 h = 4 SWS = 56 h attendance time + 94 h independent work Master: 180 h = 4 SWS = 56 h attendance time + 94 h independent work + 30 h additional task
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP (calculation as above) with additional task, which will be announced as part of the exercise at the beginning of the semester
Mandatory prerequisites :	
Recommended prerequisites:	Programming paradigms (PGP)
Intended learning outcomes:	In-depth understanding of concepts of functional programming In-depth knowledge of Haskell insights into the role of functional concepts in other programming languages (e.g. Python, Java, Javascript) Insights into the role of functional concepts in applications
Contents:	

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The German version is legally binding

	Functional programming in-the-small: lazy evaluation, algebraic data types, type variables and polymorphism, recursion, higher-order functions, cyclic data structures, profiling Functional programming in-the-large: Modules, Abstract data types, type classes, specifications of properties Real-world functional programming: actions, states, input/output, monads, automatic testing of functional programs with HUnit and Quickcheck, deep pointers with lenses Application examples: parser, web development
Type of examination:	Regular active participation in lectures and exercises Completion of exercises and successful presentation of solutions Oral examination
Media:	
Literature:	https://www.haskell.org/documentation/ Simon Thompson: Haskell. The craft of functional programming Bryan O'Sullivan, Don Stewart, John Goerzen: Real World Haskell Programming

English courtesy translation.
The German version is legally binding

Module title:	Fuzzy-Systeme
Engl. module name:	Fuzzy Systems
Module level, (optional):	
Abbreviation:	FS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	FIN: Chair of Computational Intelligence
Lecturer(s):	Prof. Dr. Rudolf Kruse
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Independent work = 124 hours: Pre- and post-processing of lecture and exercise Work on exercises and programming tasks
Credit points / ECTS:	5 (B.Sc.) or 6 (M.Sc.)
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of a higher programming languageAlgorithms and data structures Machine learning, data mining Algebra, Optimization
Intended learning outcomes:	Application of adequate modeling techniques for the Design of fuzzy systems Application of the methods of fuzzy data analysis and fuzzy rule learning

	Ability to develop fuzzy systems
Contents:	Introduction to fuzzy set theory, fuzzy logic and fuzzy arithmeticApplications in control engineering, approximate reasoning and data analysis
Type of examination:	Written examination (written test) lasting 120 minutes, required preliminary work: - Completion of at least two thirds of all exercises in the semester - Successful presentation of two exercises Appearance: - Completion of at least two thirds of all exercises in the semester - Successful presentation of two exercises - Timely submission of two programming tasks - Successful participation in the oral colloquium Regardless of the type of coursework/examination, regular and active participation in lectures and exercises is required.
Media:	
Literature:	Computational Intelligence A Methodological Introduction Kruse, R., Borgelt, C., Braune, C., Mostaghim, S., Steinbrecher, M.

English courtesy translation.
The German version is legally binding

Module title:	Game Design – Grundlagen
Engl. module name:	Game Design - Foundations
Module level, (optional):	
Abbreviation:	GDG
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Enrico Gebert, Prof. Dr. Holger Theisel
Lecturer(s):	Enrico Gebert, Prof. Dr. Holger Theisel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 hours: 2 hours lecture + 2 hours practical = 56 hours + 94 hours self-study and practical work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to digital games
Intended learning outcomes:	Students should be able to develop ideas for games into concepts. They know the most important components of a game and how changes to the components affect the game. They will learn methods and techniques for analyzing and improving their game concepts as well as techniques for supporting design decisions. Students acquire basic knowledge in the areas of world, character and puzzle design and are able to put this knowledge into practice. They master techniques for documenting and communicating ideas and concepts for different target groups and are able to understand the relationships between game, designer, player and society.
Contents:	Game design: definitions; tasks of a game designerThe structure of games: Components of a game The structure of games: Theme, vision, PoV and genre Game Design: World Design Game Design: Character Design Game design: setting, background story and plot Game design: puzzles, tasks and obstacles Game design: balancing and testing The game and the game designer

	The game and the player Documentation techniques Communication; the designer and the team
Type of examination:	Preliminary work: Completion of exercises and their presentation Exam: Written exam 120 min. Schein: see lecture
Media:	
Literature:	David Perry, Rusel DeMaria: David Perry on Game Design: A Brainstorming Toolbox. Cengage Learning , 2009Raph Koster: A Theory of Fun. Paraglyph Press, 2005 Jesse Schell: The Art of Game Design: A Book of Lenses. CRC Press, 2008 Tracy Fullerton: Game Design Workshop: A Playcentric Approach to Creating Innovative Games. CRC Press, 2008

English courtesy translation.
The German version is legally binding

Module title:	Game Development Project
Engl. module name:	Game Development Project
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester
Term:	
Module coordinator:	Prof. Dr.-Ing. habil Stefan Schlechtweg
Lecturer(s):	Prof. Dr.-Ing. habil Stefan Schlechtweg
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching method / weekly hours:	Lecture
Workload:	5 CP = 150h (10h attendance time + 140h independent work)
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to digital games Modules from the "Computer Games" profile line
Intended learning outcomes:	Learning objectives & acquired skills: Advanced methodological skills in the field of computer science and its applications and/or advanced personal or social skills on the basis of a specialized course. With the support of a mentor, students can implement a computer game from idea to realization. They use appropriate tools and methods for development as well as for project management and documentation.
Contents:	Presentation of ideas (pitch)Game designImplementation of the game in an engineManagement and documentation of a game project (project planning, game design document, time management)Final presentation
Type of examination:	Scientific project
Media:	
Literature:	Fullerton, Tracy (2008). Game Design Workshop. Burlington: Morgan KaufmannPerry, David and Rusel DeMaria (2009). David Perry on Game Design: A Brainstorming Toolbox.Boston: Course TechnologySchell, Jesse (2010). The Art of Game Design. A Book of Lenses. Burlington: Morgan KaufmannProject-related literature depending on the tools used

English courtesy translation.
The German version is legally binding

Module title:	Game Engine Architecture
Engl. module name:	Game Engine Architecture
Module level, (optional):	
Abbreviation:	GEA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Stefan Schlechtweg-Dorendorf
Lecturer(s):	Prof. Dr. Stefan Schlechtweg-Dorendorf; N.N. (Acagamics)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture / 2 SWS exercise Independent work: Reviewing the lecture Solving the exercises Small programming projects 150 h (42h attendance time + 108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basics of computer graphics Mathematics I to IV
Intended learning outcomes:	Learning objectives & acquired skills: Getting to know the structure and basic elements of game engines Insight into how the various components of a game engine work and how they interact Applying knowledge from various computer science fields to adequately develop game engine components Independent implementation of game engine components within a given framework system
Contents:	Game engine architectureThe game loop and time-based simulation Input and output devices

	Resource and asset management The rendering engine and animation Game AI Physics Collision Detection Distributed games and engines
Type of examination:	Examination prerequisite: Project work in the exercises Exam: Written exam 120 min.
Media:	Powerpoint, video, blackboard
Literature:	Jason Gregory: "Game Engine Architecture", Taylor & Francis, 2009 Thomas Akenine-Möller, Eric Haines, Naty Hoffman: "Real Time Rendering", Peters, 2008 Steve Rabin: "Introduction to Game Development", Charles River Media, 2010

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The German version is legally binding

Module title:	Geometrische Datenstrukturen
Engl. module name:	Geometric Data Structures
Module level, (optional):	
Abbreviation:	GDS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 3 SWS weekly exercise 1 SWS Independent work: Processing the exercises and assigned problems Follow-up of the lecture In-depth study of literature 180h = 4SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of algorithms
Intended learning outcomes:	Ability to design efficient data structures for geometric problems and to assess and compare their efficiency
Contents:	Balanced search trees, self-organizing search trees, amortized analysis, randomized data structures, interval trees, data structures for range queries, extended data structures, quad trees, fractional cascading, priority queues, segment trees, data structures for point localization in the plane, persistent data structures, dynamization of data structures
Type of examination:	

	Examination prerequisite: see lecture Exam: oral
Media:	
Literature:	Samet: Foundations of Multidimensional and Metric Data Structures.Zachmann, Langetepe: Geometric Data Structures for Computer Graphics. Mehta, Sahmi: Handbook of Data Structures and Applica-tions Morin: Open Data Structures: An Introduction

English courtesy translation.
The German version is legally binding

Module title:	GPU Programmierung
Engl. module name:	GPU Programming
Module level, (optional):	
Abbreviation:	GP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Junior Professor Dr. Christian Lessig
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture / 2 SWS exercise Independent work: Reviewing the lecture Solving the exercises
Credit points / ECTS:	5 CP -150 h (56h attendance time + 94h independent work)
Mandatory prerequisites :	
Recommended prerequisites:	Basics of computer graphics Programming skills C++
Intended learning outcomes:	Knowledge required: - Basics of parallel programming - Task-parallel programming in C++ with std::threads - Programming of data-parallel co-processors for accelerated calculation of non-graphics-specific algorithms
Contents:	Structure of the modern graphics pipelineStructure of GPUs Basics of parallel programming GPU programming techniques for general algorithms: Memory types, synchronization, patterns Mapping an algorithm to a data-parallel architecture
Type of examination:	Written examination

Media:	Slides, video, blackboard, sample programs
Literature:	D. Kirk, W. Hwu, Programming Massively Parallel Processors, Morgan Kaufmann M. D. McCool, J. Reinders, and A. Robison, Structured parallel programming: patterns for efficient computation. Elsevier/Morgan Kaufmann, 2012

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Arbeitswissenschaft
Engl. module name:	Fundamentals of Ergonomics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dipl.-Ing. Brennecke; FMB-IAF
Lecturer(s):	Dipl.-Ing. Brennecke; FMB-IAF
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors B-WMB, M-PSY, M-DigiEngB-MB-MT, B-WLO-AE, B-LA B-T, B-LS B-T, B-LG B-T, M.k.-SGA, others by arrangement, interaction with other modules Prerequisite for participation in the module Work and Production System Planning (M-MB, compulsory area - specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise Independent work: Accompanying self-study, exam preparation
Credit points / ECTS:	4
Mandatory prerequisites :	Timely enrollment for the module Examination prerequisite: Exercise certificate Exam: Written exam K90
Recommended prerequisites:	
Intended learning outcomes:	Recognizing the connections between people, technology and organization in engineering activitiesTeaching methods and standards for the humane and economic design of work Acquisition of self-competence for one's own professional activities along the career path
Contents:	Subject matter, definition, objectives and components of ergonomicsPhysiological and psychological principles of work Work design disciplines: workplace design (dimensioning of workstations, design of VDU work), work environment design (noise, lighting), work organization (design of work tasks and work content, innovative, participative work and employment concepts), work management (time management) Occupational health and safety
Type of examination:	Examination prerequisite: Exercise certificate

	Exam: Written exam K90
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Bildverarbeitung
Engl. module name:	Introduction to Image Processing
Module level, (optional):	
Abbreviation:	GrBV
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Professorship for Practical Computer Science / Image Processing, Image Understanding
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercise preparation in small groups Preparation and follow-up of the lecture material 150h = 4SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science, linear algebra
Intended learning outcomes:	Learning objectives & skills to be acquired: Ability to develop methods for solving an image processing problem Basic analytical problem-solving skills Ability to use a rapid prototyping language in image and signal processing.
Contents:	Digital image processing as an algorithmic problemProcessing multidimensional, digital signals Methods of image enhancement Basic segmentation methods
Type of examination:	

	Examination prerequisite is required Exam: Written exam 120 min.
Media:	
Literature:	see http://wwwisg.cs.uni-magdeburg.de/bv/gbv/bv.html

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Module title:	Grundlagen der Biologie
Engl. module name:	Grundlagen der Biologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	FNW, Prof. K. Braun, Prof. Stork
Lecturer(s):	FNW, Prof. K. Braun, Prof. Stork
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology Lecture: winter semester / practical course: summer semester Lecture is compulsory, practical course is optional
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 2 SWS Lecture 2 SWS Internship Independent work: Reviewing the lecture Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28h attendance time + 62h independent work) Internship: 3 CP = 90 h (28 h attendance time + 62 h independent work)
Credit points / ECTS:	Lecture: 3 Internship: 3
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I
Intended learning outcomes:	Students acquire an overview of the content and principles of general biology, zoology, cell biology, molecular biology, genetics, human biology and the ability to solve interdisciplinary problems. In the practical course, students acquire skills, e.g. in the safe preparation of samples, the use of special measuring techniques and methods as well as microworking techniques.
Contents:	Lecture: General zoology, animal physiology, neurobiology Cell biology, biochemistry of the cell, genetics Behavioral biology

	Developmental biology Internship: Histology/cytology Introduction to histological preparation techniques and staining methods Classification of dyed fabrics In vitro methods Immunocytochemistry/enzyme histochemistry Quantification methods in histology Introduction to confocal laser scanning microscopy Introduction to electron microscopy Introduction to biochemistry
Type of examination:	Lecture: Written exam 2h. Internship certificate
Media:	
Literature:	Will be announced in the lecture

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Module title:	Grundlagen der C++ Programmierung
Engl. module name:	Grundlagen der C++ Programmierung
Module level, (optional):	
Abbreviation:	C++
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Dr. Christian Rössl
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercise Independent work: Work on exercises and programming tasks 150 h = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of programming Ideally knowledge of Java (e.g. from the lecture "Introduction to Computer Science")
Intended learning outcomes:	Basic knowledge of the C++ programming languageSure handling of the most important language features (e.g. pointers, classes) New features of the C++11 standard (partial) Insight into advanced topics (e.g. template meta-programming) Basic knowledge of standard libraries Practical implementation of problems in C++ Platform-independent programming (e.g. Unix derivatives/MS Windows)
Contents:	Operation of the compiler and interaction with LinkerPrimitive data types, operators and control flow (and differences to Java) Variables, fields, pointers and pointer arithmetic Functions Classes

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	Memory management, references, exception handling Overloading operators Generic programming with templates Overview of the standard library including STL Tools (debugger, make, valgrind, doxygen) General problems (e.g. programming style, source code management, optimization, character sets/UTF-8)
Type of examination:	Regular participation in lectures and exercises Successful completion of the exercises Exam: Written exam 120 min.
Media:	
Literature:	Bjarne Stroustrup. The C++ Programming LanguageFrank B. Brokken. C++ Annotations. [http://www.icce.rug.nl/documents/cplusplus/] Scott Meyers. Effective C++ Nicolai M. Josuttis. The C++ Standard Library - A Tutorial and Reference, 2nd Edition

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Module title:	Grundlagen der Computer Vision
Engl. module name:	Introduction to Computer Vision
Module level, (optional):	
Abbreviation:	GrCV
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Professorship for Practical Computer Science / Image Processing, Image Understanding
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Project
Workload:	Attendance times: 2 SWS Lecture 2 SWS Project meeting Independent work: Project planning and implementation in teams Preparation of the project presentation Preparation and follow-up of the lecture material 150h = 4SWS = 56h attendance time + 94h independent work,
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science, linear algebra, basic knowledge of digital image processing
Intended learning outcomes:	Learning objectives & skills to be acquired: Ability to apply computer vision algorithms Ability to work independently on a small project Ability to work in a team
Contents:	Early Vision: Active Vision, Stereo Vision, Optical FlowHigh Level Vision: Template Matching, Variable Templates, Recognition by Components, Motion Tracking
Type of examination:	Examination prerequisite is required

	Exam: oral
Media:	
Literature:	see http://wwwisg.cs.uni-magdeburg.de/bv/gcv/cv.html

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Module title:	Grundlagen der Fahrzeugtechnik
Engl. module name:	Basics for Automotive Technology
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Prof. Rottengruber, FMB-IMS
Lecturer(s):	Prof. Rottengruber, FMB-IMS Dr.-Ing. Tommy Luft, FMB-IMS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Fertigungslehre
Engl. module name:	Fundamentals of manufacturing processes
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Prof. Jüttner, FMB-IWF
Lecturer(s):	Prof. Jüttner, FMB-IWF Further lecturers: apl. Prof. Bähr, Prof. Hackert-Oschätzchen, Dr. WEngl.er, FMB-IFQ
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Informationstechnik für CV, BIT
Engl. module name:	Basics of Information Technology for CV, BIT
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of Radio Frequency and Communication Technology, Professorship of Computer Engineering
Lecturer(s):	Professorship of Radio Frequency and Communication Technology, Professorship of Computer Engineering
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 3 SWS Lectures 1 SWS InternshipIndependent work: Lecture follow-up Internship preparation150h (56h attendance time +94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic university knowledge in mathematics The course requires the lecture Fundamentals of Image Processing (Faculty of Computer Science).
Intended learning outcomes:	Learning objectives & skills to be acquired: Introduction to communication technology Teaching the concepts of information, information-bearing signals, sampling, coding, modulation, noise, transmission channels and channel capacity. Development of mathematical models for the treatment of the above-mentioned concepts. Description, treatment and quantitative evaluation of information transmission systems Teaching engineering decision-making principles for the design of information transmission systems with conflicting requirements Signal-oriented image processing

	Imparting in-depth knowledge of image processing Gaining experimental experience and getting to know commercial image processing systems
Contents:	Introduction to communication technology Mathematical representation of signals as information carriers in the time and frequency domain (Fourier series and Fourier transformation) Sampling theory and the digitization of signals Source coding and data compression Mathematical description of the noise Noise behavior of the transmission channels; calculation of the bit error rate Treatment of selected digital transmission systems in the baseband (PCM, DPCM,...) Treatment of selected digital transmission systems in the passband (ASK, PSK, FSK, QAM,...) Signal-oriented image processing Methods of image acquisition Color image analysis Pattern recognition 3D measurement
Type of examination:	Internship certificate (successful completion of the internship)
Media:	Overhead, projector
Literature:	see script

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Maschinenelemente
Engl. module name:	Fundamentals of Machine Elements
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	apl. Prof. Bartel, FMB
Lecturer(s):	apl. Prof. Bartel, FMB-IMK Further lecturers: Dr. Bobach, FMB-IMK
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der nutzerorientierten Frontend-Entwicklung
Engl. module name:	Basics of user-oriented front-end development
Module level, (optional):	
Abbreviation:	GNFE
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Christian Hansen
Lecturer(s):	Dr. Mareike Gabele
Language:	---
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. DIGIENG - Methods of Computer Science
Teaching method / weekly hours:	Seminar; Project
Workload:	5 credit points = 150 hours (20 hours lecture + 130 hours project Block seminar Project work Consolidation of the lecture materialDevelopment of a solution to the project task
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The development of a human-computer interface combines technical implementation with accessibility for users. For a well-founded development of a front end, the knowledge about previous experiences and expectations of users, as well as human perception in software interaction and the resulting user experience principles and corresponding technical requirements are learned. Through knowledge of guidelines and the reflection that this enables, the decision can be made in their application to follow them - or to consciously break with them.

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	By applying the principles learned, new frontends can be created or existing frontends can be evaluated. This increases the quality of the software development results. The aim is to promote conscious and well-founded decisions in the steps of software development. This enables the independent critical examination of practical implementations and their further development on the one hand and the further development and consolidation of existing strategies in the research focus on the other. This develops skills for working in interdisciplinary teams as well as the ability to create future-oriented, innovative approaches.
Contents:	User experience principles based on experience and expectation and cognitive processing in connection with technical prerequisites of the software to be createdFocus on concept decision in the frontendCreating and presenting a practical application of the principles learned using a sample task
Type of examination:	Presentation
Media:	Presentation slides, video of the generated solution, implementation presentation and explanation
Literature:	Possible deepening Don NormanJakob NielsenJon Yablonski

English courtesy translation.
The German version is legally binding

Module title:	Grundlagen der Theoretischen Informatik
Engl. module name:	Introduction to the Theory of Computation
Module level, (optional):	
Abbreviation:	GTI
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship of Theoretical Computer Science / Formal Languages / Automata Theory, Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Till Mossakowski/Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 2 SWS Exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 5 SWS = 70h attendance time + 80h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Application of the basics of automata theory and formal languages for problem solving Ability to assess and classify problems in terms of predictability and complexity
Contents:	Introduction to formal languages (regular languages and grammars), elementary automata theory (finite automata, basement automata), computational models and Church's thesis, decidability and semi-decidability, complexity classes P and NP, NP-completeness
Type of examination:	Examination prerequisites: see lecture Exam: Written exam 120 min.

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Media:	
Literature:	Hopcroft, Motwani, Ullmann; Introduction to Automata Theory, Formal Languages and Complexity TheoryLewis, Papadimitriou; Elements of the Theory of Computation Sipser; Theory of Computation.

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Module title:	Grundlagen der Theoretischen Informatik II
Engl. module name:	Introduction to the Theory of Computation II
Module level, (optional):	
Abbreviation:	GTI
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship of Theoretical Computer Science / Formal Languages / Automata Theory, Professorship of Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Till Mossakowski/Prof. Dr. Stefan Schirra/
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 4 SWS = 56h attendance time + 94h independent work.
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of Theoretical Computer Science
Intended learning outcomes:	Learning objectives & acquired skills: Application of advanced automata theory and formal languages for problem solving Ability to assess and classify complex problems in terms of calculability and complexity
Contents:	Further information on formal languages (Kleene algebra, homomorphisms, normal forms of grammars) and automata (variants, state minimization), equivalence of different computational models (e.g. Turing machines, Regsiter machines, primitive recursive and mu-recursive functions, grammars), further undecidable and NP-complete problems.

Type of examination:	Examination requirements: see lecture Exam: Written exam 120 min
Media:	
Literature:	Sipser; Theory of Computation.Kozen; Automata and Computability Shallit: A Second Course in Formal Languages and Automata Theory

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The German version is legally binding

Module title:	Grundlagen der Theoretischen Informatik III
Engl. module name:	Introduction to the Theory of Computation III
Module level, (optional):	
Abbreviation:	GTI III
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 1 SWS exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 4 SWS = 56h attendance time + 94h independent work.
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of Theoretical Computer Science I + II
Intended learning outcomes:	Dealing with difficult algorithmic problems Ability to assess and classify complex problems more accurately in terms of calculability and complexity.
Contents:	Deterministic context-free languages, Kleene algebras, exact and approximation algorithms for hard problems, Probabilistic Turing machines, Circuit families, further complexity classes.
Type of examination:	Examination prerequisites: see lecture Exam: Written exam 120 min.
Media:	

Literature:	Sipser; Theory of Computation Kozen; Automata and Computability

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The German version is legally binding

Module title:	Grundlagen des Industriedesigns
Engl. module name:	Grundlagen des Industriedesigns
Module level, (optional):	
Abbreviation:	ID module 1
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Lecturer(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture (WS) 2 SWS Exercise - Basics of Visual Design (WS+SS) Independent work: 2 hours/week for paperwork 150h=4 SWS=56h attendance time+94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Interest in design aspects of product and environmental design as well as own design activities
Intended learning outcomes:	Learning objectives and acquired skills Knowledge and basic knowledge of industrial design Introduction to the way of thinking and design in industrial design when developing products Sensitization for formal-aesthetic qualities and training of design skills for surface design
Contents:	Design as part of product qualityHuman-centered design requirements and usage processes (aesthetics and ergonomics) Methodology of the design process and its interfaces to the integrated product development process Design tools: function and use in the design process Visualization techniques in the design process Property rights in design practice Design practice - examples History of functional design 15 Exercises for area design
Type of examination:	The module contains two parts:

	Lecture: Full participation in the course (attendance check) Exercise: Assessment of all exercises An overall grade is calculated from both performance components.
Media:	
Literature:	

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The German version is legally binding

Module title:	Grundlagen verteilter Sensordatenfusion
Engl. module name:	Introduction to Distributed Sensor Data Fusion
Module level, (optional):	
Abbreviation:	SDF
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Benjamin Noack
Lecturer(s):	Prof. Dr. Benjamin Noack
Language:	English
Assignment to the curriculum:	FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. VC - Visual Computing - Electives
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Independent preparation and follow-up 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6 CP
Mandatory prerequisites :	none
Recommended prerequisites:	none
Intended learning outcomes:	You have an overview of basic problems and methods in designing distributed sensor systems and their applications. You understand how to process data in a network of sensors, what requirements the infrastructure must meet, and how to model and describe errors like measurement noise. You are familiar with the mathematical tools and can apply them. You can analyze, compare, and evaluate different approaches to information processing of sensor data.

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The German version is legally binding

Contents:	This lecture introduces basic principles, requirements, and methods of sensor data processing. Since data are more often gathered by networked sensor systems, this lecture places particular emphasis on distributed sensor data fusion methods. We will start by discussing the technical specifications of a sensor system and the basics of digital sensor data processing. Our study includes sampling theorems, compressive sensing, and signal matching. We will consider the required infrastructure to process sensor data in networked systems, i.e., sensor networks. Based on this infrastructure, we can apply methods for multisensor data fusion to spatially distributed sensors and can monitor spatio-temporal processes.
Type of examination:	Exam: oral
Media:	
Literature:	

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Module title:	Grundlegende Algorithmen und Datenstrukturen
Engl. module name:	Fundamental Algorithms and Data Structures
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Winter semester
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 1 SWS exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	"Algorithms and data structures" (Introductory event)
Intended learning outcomes:	Learning objectives & acquired skills: Basic ability to apply sequential and parallel algorithms to solve problems skills to evaluate them, especially with regard to their efficiency.
Contents:	Advanced design and analysis techniques, probabilistic analysis and randomized algorithms, basic graph algorithms, PRAM algorithms.
Type of examination:	Examination prerequisites: see lecture Examination: oral
Media:	

Literature:	Cormen, Leiserson, Rivest, Stein; Introduction to Algorithms

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The German version is legally binding

Module title:	Grundzüge der Algorithmischen Geometrie
Engl. module name:	Basic Introduction to Computational Geometry
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Prof. Dr. Stefan Schirra
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 1 SWS exercise Independent work: Processing the exercises Follow-up of the lectures 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures (introductory course)
Intended learning outcomes:	Learning objectives & acquired skills: Ability to solve elementary geometric problems algorithmically and evaluate them, especially with regard to their efficiency Ability to describe and apply fundamental geometric structures to solve problems
Contents:	Plane-sweep and divide-and-conquer as design principles for geometric algorithms, convex hull, triangulation of point sets and polygons, data structures for point localization and range queries. Simple geometric problems with applications in computer visualization
Type of examination:	Examination prerequisites: see lecture Exam: Written exam 120 min.

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Media:	
Literature:	de Berg, Cheong, van Kreveld, Overmars: Computational Geometry (3rd Edition).Klein: Algorithmic Geometry (2nd Edition).

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The German version is legally binding

Module title:	Hardwarenahe Rechnerarchitektur
Engl. module name:	Hardware-related computer architecture
Module level, (optional):	
Abbreviation:	HWRA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Professorship for Hardware-related Computer Engineering
Lecturer(s):	Dr.-Ing Gerald Krell
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Engineering
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 1 SWS Lecture 1 SWS exercise 2 SWS Laboratory practical course Independent work: Practice and internship preparation, consultation 150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Attendance of the preceding courses in the field of technical computer science
Intended learning outcomes:	- Understanding of the processes in the computer and the associated peripherals at signal level - Development of the ability to complete computers with suitable interfaces or to use them as embedded hardware - Getting to know elements of programmable logic - Ability to use highly integrated components for processing tasks in devices
Contents:	- Hardware aspects of data paths - Direct memory access, cache memory - Analog interfaces, image input/output - Signal processors - Application of single-chip controllers, systems on chip (SOCs) - High-level synthesis of programmable logic - Embedded Vision

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Type of examination:	Services: Internship certificate Exam: written
Media:	Elearning, Beamer
Literature:	see script

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The German version is legally binding

Module title:	Hardwarenahe Rechnerarchitektur für CV, BIT
Engl. module name:	Hardware-related computer architecture for CV, BIT
Module level, (optional):	
Abbreviation:	HWRA-CV,BIT
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Hardware-related Computer Engineering
Lecturer(s):	Dr.-Ing. Gerald Krell
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise, 1 SWS Internship Independent work: Practice and internship preparation, consultation 180h = 4 SWS = 56 h attendance time + 124 h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	Internship certificate
Recommended prerequisites:	Attendance of the preceding courses in the field of technical computer science
Intended learning outcomes:	- Understanding of the processes in the computer and the associated peripherals at signal level - Development of the ability to complete computers with suitable interfaces or to use them as embedded hardware - Getting to know elements of programmable logic - Developing an understanding of the functions of image input and output interfaces
Contents:	- Structure and function of basic elements - Hardware aspects of data paths - Computer design basics - RISC, CISC, machine instructions - Bus systems - Ports, semiconductor memory - Addressing of memory cells and ports - Direct memory access, cache memory - Classification according to Flynn

	- Analog interfaces, image input/output - Signal processors - Application of single-chip controllers, systems on chip (SOCs) - High-level synthesis of programmable logic - Embedded Vision
Type of examination:	Services: Internship certificate Exam: written (2h)
Media:	Elearning, Beamer
Literature:	see script

English courtesy translation.
The German version is legally binding

Module title:	HealthTEC Innovation Design
Engl. module name:	HealthTEC Innovation Design
Module level, (optional):	
Abbreviation:	HTID
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	---
Module coordinator:	Prof. Dr. Michael Friebe
Lecturer(s):	Prof. Dr. Michael Friebe
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: - 2.5 SWS Lecture - Independent work: Follow-up of the lecture material, individual tasks, teamwork, preparation of presentations and papers, exam preparation
Credit points / ECTS:	5 credit points for B.Sc. CV = 150h = 2.5 SWS = 35h attendance time + 115h self. work 6 credit points for M.Sc. CV = 180h = 2.5 SWS = 35h attendance time + 145h self. Work (additional individual task compared to the B.Sc.) Grading scale according to examination regulations
Mandatory prerequisites :	none
Recommended prerequisites:	Interest in interdisciplinary innovation generation in the healthcare sector ... own realizable ideas are not necessary. Some preparatory articles will be provided by the lecturer before the start of the lecture.
Intended learning outcomes:	Learning objectives & skills to be acquired: - Stanford Biodesign Principle - Identify / Invent / Implement so-called Unmet Clinical Need - Teaching innovation methods for definition and validation (Blue Ocean Design, Innovation Segments, Value Proposition Canvas, Business Model Canvas, etc.) - Insight: How does the healthcare system work and what innovation needs are there? How do I recognize them? - Insight: What will the future look like in the healthcare sector? - Interdisciplinarity as the basis for innovation in healthcare - International differences in the need for innovation - Development of a "minimal viable prototype" ... also with the help of the HealthTEC INNOLAB laboratories and subsequent validation with the stakeholders
Contents:	- Introduction to international health economics - New business models as the basis for new developments or vice versa

	- Exponential technology and its influence on global developments in healthcare (AI, robots, genetics, 3D printing, ...) - Communication of innovation technologies - Communication of the innovation process in the healthcare sector - Ethical principles in connection with the new technologies (use of data, privacy, ...) - Information and introduction to the team - final thesis
Type of examination:	Examination prerequisite: see lecture Examination: written in the last lecture block (45 minutes) plus presentation of a team project (3 students per team, presentation and elaboration) on an innovation topic in healthcare (template will be provided). For the Master CV, an additional individual thesis on the topic of ethics is completed using the ethics canvas and the selected innovation project.
Media:	
Literature:	1. Hendricks, D., "Why Entrepreneurs Are the Future of Healthcare." http://www.inc.com/drew-hendricks/whyentrepreneurs-are-the-future-ofhealthcare.html (2016). 2 Christensen, C., Bohmer, R., Kenagy, J., "Will Disruptive Innovations Cure Health Care?", HARVARD BUSINESS REVIEW, Sept-Oct 2000 issue. https://hbr.org/2000/09/will-disruptiveinnovations-cure-health-care (2000). 3 Schroeder, S., "We Can Do Better - Improving the Health of the American People", N Engl J Med 2007; 357:1221-1228 (2007) 4. Kraft, D., "The Future of Healthcare Is Arriving - 8 Exciting Areas to Watch." https://singularityhub.com/2016/08/22/exponential-medicine-2016-the-future-of-healthcare-is-coming-faster-than-you-think/ (2016). 5 Friebe, M., "Exponential Technologies + Reverse Innovation = Solution for Future Healthcare Issues? What Does It Mean for University Education and Entrepreneurial Opportunities?", Open Journal of Business and Management, 5, 458-469 (2017). 6 Kabir, M., "Does artificial intelligence (AI) constitute an opportunity or a threat to the future of medicine as we know it?", Future Healthcare Journal 2019, Vol 6, No 3: 190-1 (2019). 7. Christensen, C., Waldeck, A., Fogg, R., "The Innovation Health Care Really Needs: Help People Manage Their Own Health.", Harvard Business Review Oct. 30, 2017. https://hbr.org/2017/10/the-innovation-health-care-really-needs-help-people-manage-their-own-health?autocomplete=true (2017). 8. UK Department of Health and Social Care, "The future of healthcare: our vision for digital, data and technology in health and care", Published October 17, 2018. https://www.gov.uk/government/publications/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-

	and-care/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-and-care (2018). 9 Zenios, S., Makower J., Yock. P. Et al [Biodesign: The Process of Innovating Medical Technologies], Cambridge University Press, 2009 10 Michael Friebe (2017). International Healthcare Vision 2037: New Technologies, Educational Goals and Entrepreneurial Challenges. Edited by Michael Friebe, 09/2017; Otto von Guericke University, Magdeburg, Germany, ISBN: 978-3-944722-59-7, DOI: https://doi.org/10.24352/UB.OVGU-2017-76 11 Traub J., Ostler D., Feussner H., Friebe M. (2019) Global innovations in medical technology - Interdisciplinary education at the university. In: Pfannstiel M., Da-Cruz P., Schulte V. (eds) Internationalization in Healthcare. Springer Gabler, Wiesbaden. https://doi.org/10.1007/978-3-658-23016-6_14

English courtesy translation.
The German version is legally binding

Module title:	Heterogeneous Computing
Engl. module name:	Heterogeneous Computing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, bi-weekly exercises 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 3 SWS / 6 credit points = 180 h (42 h attendance time + 138 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science
Intended learning outcomes:	Learning objectives and acquired skills: After successfully completing the module, students will be able to discuss the computing principles of different hardware platforms and select a suitable computing principle for a given application. They can create applications that can be implemented on different hardware platforms and make optimum use of their hardware properties. Students can assess the effects of different description styles in high-level synthesis and restructure given code in such a way that it can be implemented efficiently on different hardware platforms. Furthermore, they can independently determine how an application can be divided between the different processing units in hybrid system architectures. Through practical exercises, students are able to deepen their knowledge and skills in a research-oriented manner and apply and evaluate them in complex problems.

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Contents:	Hardware architecture of GPUs and FPGAsDynamic reconfiguration of FPGAs Manycore architectures Data flow computer Development of hybrid computer systems Programming models for manycore systems OpenCL High-level synthesis Hardware/software co-design
Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Hörakustik
Engl. module name:	Psychoacoustics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Jesko L. Verhey, FME Further lecturers: Prof. H. Rotten-gruber
Lecturer(s):	Prof. Dr. Jesko L. Verhey, FME Further lecturers: Prof. H. Rotten-gruber
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics Interactions with modules "Engine and vehicle acoustics" and "Vibroacoustics".
Teaching method / weekly hours:	Lecture; Seminar
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, Independent work: Follow-up of the lecture, assignments to prepare for the exercise
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives and skills to be acquired: Knowledge of basic acoustic parameters Basic knowledge of measurement methods for hearing acoustics Basic knowledge for the perceptual characterization of environmental sounds
Contents:	Fundamentals and basic concepts of hearing acoustics, sensory variables and their relation to physical parameters Differential perception, masking Calculation method for determining loudness as a fundamental sensory variable in hearing acoustics Perception of level fluctuations and their significance in the evaluation of technical sounds, e.g. roughness Characterization of the perception of tonal sounds, i.e. pitch, tonality, timbre, application to engine sounds Bei-ear hearing perception
Type of examination:	Exam: oral
Media:	

Literature:	Fastl and Zwicker, "Psychoacoustics, Facts and Models", 3rd Ed., Springer Berlin, ISBN 978-3-642-51765-5

English courtesy translation.
The German version is legally binding

Module title:	Human Factors
Engl. module name:	Human Factors
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Deml
Lecturer(s):	Brennecke, Deml
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture: 2 SWS, Exercise: 1 SWS Independent work: Follow-up of the lectures Preparation for the written exam 75 h (42 h attendance time + 33 h independent work)
Credit points / ECTS:	3
Mandatory prerequisites :	Participation in lectures Passing the written exam
Recommended prerequisites:	
Intended learning outcomes:	The aim of the course is to convey the relationships between people, technology and organization that are relevant to engineering activities. The participants should acquire methods and standards in order to be able to design work in a humane way. The necessity of planning and designing the human-technology-organization relationship in such a way that human performance potential can be optimally utilized and further developed in a targeted manner and that there are no harmful or detrimental effects on human health and well-being is conveyed. In this way, economic efficiency can be realized in unity with the humanity of work. For engineers who are not specialists in work design, the courses offer the fundamentals of ergonomics and guidelines and impulses for action.
Contents:	Subject matter, definition, objectives and components of ergonomicsPhysiological and psychological principles of work Workplace design

	Design of VDU work Work environment design (noise, lighting) Work organization Human information processing Human-machine interaction Human reliability and errors Time management Occupational health and safety
Type of examination:	Written examination
Media:	Powerpoint
Literature:	Will be provided in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Human-Centred Approaches and Technologies
Engl. module name:	Human-Centred Approaches and Technologies
Module level, (optional):	
Abbreviation:	HCAT
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Ernesto W. De Luca
Lecturer(s):	Ernesto W. De Luca / Erasmo Purificato
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar; Project
Workload:	Master 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work Attendance times: weekly seminar: 2 SWS / weekly project: 2 SWS Independent work: 98h independent work (readings; follow-up of the lecture, preparation of paper, reviews and presentation as part of the exam). Project: 30h work on one of the proposed projects in HCAT. 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Machine Learning Information Retrieval Data Science Data Mining Fundamentals of Natural Language Processing Introduction to Deep Learning Human-Centred Artificial Intelligence
Intended learning outcomes:	Understanding of scientific writing Ability to evaluate scientific papers

	Involvement in scientific conferences Familiarity with online submission and review platforms
Contents:	Scientific Writing Understanding of Scientific Conferences Reviewing papers and related process Conducting a comprehensive systematic research literature review Evaluating research papers and the work of fellow students Delivering a final presentation and paper, which could be presented on a conference event Topics: Human-Centred Artificial Intelligence and Human-Centred Design
Type of examination:	Scientific paper Reviews on other papers Presentation of the own results presented in the paper.
Media:	
Literature:	- V. Dignum, "Responsible Artificial Intelligence - How to Develop and Use AI in a Responsible Way", Springer, 2019. - B. Shneiderman, "Human-Centered AI", Oxford University Press, 2022. - A. Schmidt, "Interactive Human Centered Artificial Intelligence: A Definition and Research Challenges". - S. Barocas et al, "Fairness and Machine Learning", 2019. - Documents related to Certification as Professional for Usability and User Experience (CPUX) https://uxqb.org/en/documents/

English courtesy translation.
The German version is legally binding

Module title:	Human-Centred Artificial Intelligence
Engl. module name:	Human-Centred Artificial Intelligence
Module level, (optional):	
Abbreviation:	HCAI
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	---
Module coordinator:	Prof. Dr. Ernesto De Luca
Lecturer(s):	Prof. Dr. Ernesto De Luca
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	Attendance times: weekly lecture 2 SWS / weekly exercise/project 2 SWS Independent work: 124 hours of independent work (working on exercises, reviewing the lecture, preparing for the exam) 180h = 56h (4SWS) attendance time + 124h independent work
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Machine Learning Information Retrieval Data Science Data Mining Fundamentals of Natural Language Processing Introduction to Deep Learning
Intended learning outcomes:	Human-Centred AI principles; Responsible AI principles; Introduction to fairness and explainability; Ethics in AI; Applications of HCAI methods on deep learning architecture and natural language processing algorithms; User Experience and Usability; Approaches to project management and planning.
Contents:	Introduction to Human-Centred Artificial Intelligence:

	Human values in AI;The role of stakeholders;Novel HCAI Framework and Paradigms;Threats in AI;Interactive Human-Centred AI. Introduction to Responsible Artificial Intelligence: Ethical theories and ethics in practice;Responsible research and innovation;The ART of AI: Accountability, Responsibility, Transparency;Ensuring Responsible AI in practice;AI and Society. Beyond-accuracy perspectives: Privacy;Fairness and Biases;Explainable Artificial Intelligence (XAI);Accountability;Security and Safety. Approaches to project management and planning: Project management;People management and Teamwork;Agile development;Risk management;Estimation techniques and project pricing;Quality standards and management.
Type of examination:	Services: Completion of the exercises;Completion of the programming tasks;Successful presentation of the results of the project. Written exam (also for Schein). Preliminary work as specified at the beginning of the semester.
Media:	
Literature:	- V. Dignum, "Responsible Artificial Intelligence - How to Develop and Use AI in a Responsible Way", Springer, 2019. - B. Shneiderman, "Human-Centered AI", Oxford University Press, 2022. - A. Schmidt, "Interactive Human Centered Artificial Intelligence: A Definition and Research Challenges". - S. Barocas et al, "Fairness and Machine Learning", 2019.

English courtesy translation.
The German version is legally binding

Module title:	Human-Centred Natural Language Processing
Engl. module name:	Human-Centred Natural Language Processing
Module level, (optional):	
Abbreviation:	HCNLP
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Ernesto William De Luca
Lecturer(s):	Prof. Dr.-Ing. Ernesto William De Luca
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: weekly block seminar Independent work: 98 hours of independent work (working on exercises; follow-up of the lecture, preparation for the exam) Project for Master's students: 30 hours of work on one of the proposed projects in HCNLP Master 180h = 52h (4 SWS) attendance time + 98h independent work + 30h project work
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Human-Centred NLP principles; Language Representation and Language Engineering, NLP Models (rule-based, count-based, prediction-based); Dataset Creation and Curation; Human-Computer Interaction, Human-Centred Evaluation of NLP Systems, Human-Centred Design, Human-Centred NLP Applications, Human-AI Collaboration
Contents:	- What is Human-Centered Natural Language Processing

	- Traditional Natural Language Processing: Rule-based and Count-based Models - Modern Natural Language Processing: Prediction-based Models - Language Engineering - Dataset Creation - Dataset Curation with Human Values in Mind - Human-Computer Interaction - Human-Centered Evaluation of NLP Systems - Human-Centered Design of NLP Systems - Human-Centered NLP Applications: Digital Humanities, Legal Artificial Intelligence, Recommender Systems - Human-AI Collaboration and Future Directions
Type of examination:	Services: - Processing the exercises; - Processing the programming tasks; - Successful presentation of the project results. Written examination (also for Schein). Preliminary work as specified at the beginning of the semester.
Media:	
Literature:	- Manning, C., & Schutze, H. (1999). Foundations of statistical natural language processing. MIT press. - Ziems, C., Yu, J. A., Wang, Y. C., Halevy, A., & Yang, D. (2022). The moral integrity corpus: A benchmark for ethical dialogue systems. arXiv preprint arXiv:2204.03021. - Niven, T., & Kao, H. Y. (2019). Probing neural network comprehension of natural language arguments. arXiv preprint arXiv:1907.07355. - Belz, A., Thomson, C., Reiter, E., Abercrombie, G., Alonso-Moral, J. M., Arvan, M., ... & Yang, D. (2023). Missing information, unresponsive authors, experimental flaws: The impossibility of assessing the reproducibility of previous human evaluations in NLP. arXiv preprint arXiv:2305.01633. - Bansal, G., Wu, T., Zhou, J., Fok, R., Nushi, B., Kamar, E., ... & Weld, D. (2021, May). Does the whole exceed its parts? the effect of ai explanations on complementary team performance. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (pp. 1-16).

English courtesy translation.
The German version is legally binding

Module title:	Hybride Discrete Event Systems
Engl. module name:	Hybride Discrete Event Systems
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT) / Dr.-Ing. Jürgen Ihlow (FEIT-IFAT)
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT) / Dr.-Ing. Jürgen Ihlow (FEIT-IFAT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	3 SWS = 150h (42h attendance time +108h independent work) Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving exercises and exam preparation, project work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Control engineering, control technology, discrete-event systems
Intended learning outcomes:	Learning objectives and acquired skills: The module provides an introduction to the theory, description and analysis of systems that contains continuous, discrete and event driven dynamics. Specific focus is set on the introduction of various system descriptions, on the analysis of the properties of the systems, as well as on the design and development of suitable control and observation methods
Contents:	Hybrid Dynamical Systems: Signals, information, states and inputs, general system description, basic system propertiesDescription of hybrid dynamical systems:Modeling, time-behavior, hybrid states, events, automata, petri-networksAnalysis of hybrid-discrete event systems:stability, reachability, accesabilityDesign for hybrid systems
Type of examination:	Oral examination
Media:	
Literature:	

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The German version is legally binding

Module title:	Idea Engineering
Engl. module name:	Idea Engineering
Module level, (optional):	
Abbreviation:	IE
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Idea Engineering FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Study profile - Web founder FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	150 hours (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Task-oriented development of idea generation techniques Milestone-oriented project work in a team Planning and moderation of workshops Ability to think creatively and produce ideas Leading and structuring discussions Presentation and reporting of own work results using digital media forms
Contents:	Innovation processBasics of idea generation techniques Change of perspective Evaluation of ideas Selection and expansion of ideas Classic creativity techniques Production of advertising ideas
Type of examination:	Examination performance Graded: Term paper Ungraded: Passing the term paper
Media:	

Literature:	See www.sim.ovgu.de

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The German version is legally binding

Module title:	IDE-Projekt I-III
Engl. module name:	IDE Project I-III
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	every semester
Module coordinator:	Prof. Dr.-Ing. Christiane Beyer, FMB-IMK
Lecturer(s):	Prof. Dr.-Ing. Christiane Beyer, FMB-IMK Further lecturers: Dipl.-Designer Matthias Trott, FMB-IAF, Dr.-Ing. Dipl.-Math. Michael Schabacker, FMB-IMK, Dr.-Ing. Ramona Träger, FMB-IMK
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: B.Sc. CV - General Visualistics - Design
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Image Coding
Engl. module name:	Image Coding
Module level, (optional):	
Abbreviation:	IC
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr. Gerald Krell
Lecturer(s):	Dr. Gerald Krell
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INGINF - Engineering Informatics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS (2 SWS lecture + 1 SWS exercise) = 150h = 42h attendance time + 108h independent work Independent work: Lecture follow-up, exercises, exam preparation
Credit points / ECTS:	5 Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics/physics for engineers/computer scientists or similar, basics of information technology, basics of electronics
Intended learning outcomes:	Learning objectives & skills to be acquired: The aim of the course is to familiarize students with the basic methods and techniques of image coding as an essential task in image communication. Problems of image acquisition are explained insofar as they are relevant to image coding, and the increasingly important content-oriented (semantic) techniques are dealt with on the basis of signal and information theory methods.
Contents:	Basics, lossless coding, lossy coding Coding, semantic coding, standards
Type of examination:	Exam: oral (30 min)
Media:	
Literature:	see script

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Module title:	Immunologie
Engl. module name:	Immunologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	FME, Prof. Dr. B. Schraven
Lecturer(s):	FME, Prof. Dr. B. Schraven
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: - 2 SWS lecture / 2 SWS practical course Independent work: - Reviewing the lecture - Preparation and follow-up of the internship Lecture: 3 CP = 90 h (28h attendance time + 62h independent work) Internship: 2 CP = 60 h (28 h attendance time + 32 h independent work)
Credit points / ECTS:	Lecture: 3 Internship: 2
Mandatory prerequisites :	Passing the Immunology exam is a prerequisite for participation in the practical course
Recommended prerequisites:	
Intended learning outcomes:	Students develop the ability to describe and evaluate specific features and systematic problems of immunology. During the internship, students are trained to master the specific working techniques of the subject area.
Contents:	Introduction to immunologyImmune organs Immune cells Immune mechanisms Immunity
Type of examination:	Written exam 2 hrs. Internship certificate

Media:	
Literature:	Will be announced in the lecture

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The German version is legally binding

Module title:	Implementation techniques for software product lines
Engl. module name:	Implementation Techniques for Software Product Lines
Module level, (optional):	
Abbreviation:	ISP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Gunter Saake
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	5 CP: 150h = 56h attendance + 94h independent work 6 CP: 180h = 150h + 30h additional tasks
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP
Mandatory prerequisites :	Regular participation in lectures and exercises. Oral examination at the end of the module and project work. Cannot be taken together with "Advanced Programming Concepts for Tailor-Made Data Management" or "Advanced Programming Concepts for Tailor-Made Data Management" (old name).
Recommended prerequisites:	The basics of software engineering are a prerequisite; Basic knowledge of compiler construction and concepts of Programming languages are recommended
Intended learning outcomes:	Understanding of the limitations of traditional programming paradigms with regard to the development of information systemsKnowledge of modern, advanced programming paradigms with a focus on the creation of customized systems

	Ability to evaluate, selection
Contents:	Introduction to the problem of customized systems using the example of embedded DBMS modeling and implementation of software product lines Introduction to basic concepts (e.g. separation of concerns, information hiding, modularization, structured programming and design) Overview of advanced programming concepts including components, design patterns, meta-object protocols and aspect-oriented programming, collaborations and feature-oriented programming
Type of examination:	Lecture and lecture-accompanying exercise with questionnaires including a programming lab on a selected topic of the lecture; independent work on the exercises and the selected topic as a prerequisite for the exam Examination/Certificate: oral
Media:	
Literature:	Feature-Oriented Software Product Lines: Concepts and Implementation. Sven Apel, Don Batory, Christian Kästner, Gunter Saake, October 2013, ISBN: 978-3-642-37520-0, Springer-Verlag

Module title:	Industrial 3D Scanning - Theory and Best-practices
Engl. module name:	Industrial 3D Scanning - Theory and Best-practices
Module level, (optional):	
Abbreviation:	3D Scanning
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship Visualization
Lecturer(s):	Dr. Christian Teutsch (Fraunhofer IFF)
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Time of attendance: 2 SWS Lecture, 2 SWS Seminar Autonomous work: programming of algorithms in C/C++ 180 h (56 h time of attendance + 124 h autonomous work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Although no formal prerequisites are necessary, the lecture is primarily intended for students with a background in computer graphics or computer vision.
Intended learning outcomes:	An understanding of 3D scanning in industrial metrologyAn understanding of 3D data structures and processing algorithms An understanding of algorithms that support the comparison of measured 3D data against CAD models An understanding of methods to visualize large amounts of 3D data with modern graphics hardware
Contents:	An introduction into 3D scanning technologies including typical industrial applications Best-fit approximation of geometric primitives to 3D point clouds Registration and spatial alignment of 3D point clouds to CAD models Metrological 3D data analysis and comparison methods Visualization of large amounts of 3D points including out-of-core data management and level-of-detail algorithms

Type of examination:	tutorial certificate, oral exam
Media:	
Literature:	de Berg, M., Cheong, O., van Kreveld, M., Overmars, M., "Computational Geometry: Algorithms and Applications", 3rd Edition, Springer, 2008Ahn, S. J., "Least Squares Orthogonal Distance Fitting of Curves and Surfaces in Space", Springer LNCS, 2008

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The German version is legally binding

Module title:	Industriedesign-Designprojekt
Engl. module name:	Industriedesign-Designprojekt
Module level, (optional):	
Abbreviation:	ID module 3
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	
Module coordinator:	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Lecturer(s):	HD Dipl.Designer, Dipl.-Ing. Thomas Gatzky
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Exercise
Workload:	Attendance times: 3 SWS Exercise - Design project (WS+SS) Independent work: 8 hours/week for project work150h=3 SWS=42h attendance time+108h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Interest in design aspects of product and environmental design as well as own design activities Successful completion of ID module 1 and 2
Intended learning outcomes:	Learning objectives and acquired skills Advanced skills and abilities in drafting and computer-aided design Competencies in design methodologies in industrial design in interdisciplinary teams
Contents:	Methodically supported design of products and environmental situationsClassical and computer-aided visualization techniques Acquisition of advanced skills in the use of the CAID software Alias/Wavefront Studio Tools Complex visualizations with interfaces to CAD systems and image design Complex product design-Collaboration in an interdisciplinary team (IPE project/design project)
Type of examination:	Graded evaluation of the project work (presentation and project documentation)

Media:	
Literature:	

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The German version is legally binding

Module title:	Informatik vermitteln - Entwicklung und Umsetzung medienpädagogischer Projekte
Engl. module name:	Informatik vermitteln - Entwicklung und Umsetzung medienpädagogischer Projekte
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	FIN/ISG; Dr. Henry Herper
Lecturer(s):	FIN/ISG; Dr. Henry Herper
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Educational Science MB: 9, 10, 11, 13
Teaching method / weekly hours:	Seminar; Project
Workload:	Attendance times: 2 SWS = 28h Independent work: 152h
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The students can independently develop media education concepts with computer science content can put these concepts into practice in a didactically sound manner know the basic principles of project development know the legal framework for dealing with digital media are able to implement a project across study programs can structure computer science content for specific target groups
Contents:	Basic concepts of project developmentDidactic principles of teaching Creation and management of digital teaching materials Educational standards and their curricular implementation Legal framework conditions for the use of digital media in the educational environment Theoretical references to dealing with digitality in everyday life and society Impulses for computer science-related project ideas

	Development and implementation of target group-specific informatics projects
Type of examination:	Homework, implementation of a course
Media:	
Literature:	

Module title:	Information Retrieval
Engl. module name:	Information Retrieval
Module level, (optional):	
Abbreviation:	IR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Andreas Nürnberger
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Methods II area
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Completion of exercises and programming tasks; follow-up of the lecture 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Participation requirements: Algorithms and data structures
Intended learning outcomes:	In-depth understanding of information retrieval problemsKnowledge of data structures and algorithms that enable students to independently develop and evaluate information retrieval systems.
Contents:	Statistical properties of texts, retrieval models and data structures, relevance feedback, evaluation, basics of XML, structuring of data collections (clustering, categorization), structure and algorithms of internet search engines, basics of multimedia retrieval systems, interface design

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Type of examination:	Achievements: Preliminary work as specified at the beginning of the semester (voting, programming tasks) Examination: written (also for certificate)
Media:	
Literature:	Introduction to Information Retrieval, C.D. Manning, P. Raghavan, H. Schütze, Cambridge University Press, 2008.Information Retrieval: Data Structures and Algorithms, William B. Frakes and Ricardo Baeza-Yates, Prentice-Hall, 1992.

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Module title:	Informations- und Codierungstheorie
Engl. module name:	Informations- und Codierungstheorie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for High Frequency and Communication Technology
Lecturer(s):	Professorship for High Frequency and Communication Technology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times 2SWS (lecture) + 1SWS (optional exercise) Independent work Lecture follow-up 90h (28h attendance +62h independent study) work)
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Basic university knowledge in mathematics
Intended learning outcomes:	Learning objectives and skills to be acquired: Teaching the information theory concepts of information content, entropy, redundancy, source coding, channel capacity, channel coding, Hamming space and Hamming distance Creation of mathematical models for the above concepts Treatment of selected methods for source and channel coding Treatment of selected error-correcting decoding methods
Contents:	Information content and entropy of discrete information sourcesRedundancy, memory and source coding (Shannon-Fano and Huffmann methods) Continuous sources Discrete and continuous channels, channel entropies and channel capacity Channel coding and Hamming space Linear block codes

	Cyclic codes Syndrome decoding
Type of examination:	Oral examination or certificate of attendance
Media:	
Literature:	

Module title:	Informationstechnologie in Organisationen
Engl. module name:	Information Technology in Organizations
Module level, (optional):	
Abbreviation:	ITO
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Design For release and assignment to curricula of interdisciplinary degree programs and degree programs outside the FIN, see study documents of the respective degree program.
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + 2 SWS exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 150h=4 SWS=56h attendance time+94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Understanding the role of information technology for the modern company Acquire knowledge of the role of IT in a selection of business modelsAcquire knowledge of IT methods for deriving knowledge from dataAbility with literature on the subject area
Contents:	IT along the value chainData managementIT and the Internet, e-commerceCustomer relationship management
Type of examination:	Preliminary work:Successful completion of the exercisesPresentation of results Modalities will be given at the beginning of the event. Exam: written

Media:	
Literature:	Excerpts from the books BOOK W: 'ECONOMIC INFORMATICS', Hans Robert Hansen & Jan Mendling & Gustaf Neumann (2019), including chapters/text units on the following topics: E-CommerceCRMManagement supportData managementand case studies BOOK D: 'Digitalization in industry, trade and service companies' Lars Fend & Jürgen Hofmann (eds), 3rd edition, SPRINGER GABLER, including chapters/text units on Digital business modelsCRMand case studies BOOK T: 'Machine Learning Tools: Market Study, Application Areas & Solutions of the Artificial intelligence' Marcus Grum, Eldar Sultanow, Daniel Friedmann, André Ullrich, Norbert Gronau (2020) Selection of content from chapters 3, 4 and 5 Details of the syllabus will be entered in moodle during the semester. The bibliography may include additional case studies and other scientific papers. These will be announced at the beginning of each event block.

English courtesy translation.
The German version is legally binding

Module title:	In-Memory und Cloud-Technologien 1
Engl. module name:	In-Memory and Cloud Technologies 1
Module level, (optional):	
Abbreviation:	IMCloud 1
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Hon. Prof. Dr. Alexander Zeier Venue: Magdeburg
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times = 20 h: -20 h Lecture Independent work = 70 h: -20 h preparation for the lecture - reading the recommended literature 50 h follow-up of the lecture - preparation of a scientific short paper/poster
Credit points / ECTS:	3 credit points = 3*30 h = 90 h (20 h attendance time + 70 h independent work) Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Course "Databases I" and "Databases II"
Intended learning outcomes:	Learning objectives & acquired skills: -Introduction: In-memory technology with a focus on SAP HANA -Introduction: Cloud technology with a focus on Google Cloud -Digital Decoupling on Cloud for SAP Systems
Contents:	In-memory technology and applications with a focus on SAP HANA: -Explanation of in-memory technology with a focus on SAP HANA

	-Row versus column main memory databases -Compression, partitioning and indexing approaches Google Cloud technology and services, use of e.g. Anthos, Bigquery, and AutoML. The number of participants for the seminar is limited to 20 people.
Type of examination:	Exam admission: -Participation in the event Examination form: -Written term paper
Media:	
Literature:	Plattner, H., Zeier, A.: In-Memory Data Management: Technology and Applications, Springer Verlag, 2nd edition, May 2012, ISBN 978-3642295744 Whitepaper "HANA on Intel: Three Steps to Reinvent Your Enterprise as a Digital Disrupter" by Prof. Dr. Alexander Zeier & Intel CTO Enterprise Ed Goldman, 2016. Cloud Computing, Blog (July 2020) on Digital Decoupling. Title: Trapped by legacy systems, CIOs look for a way out https://www.accenture.com/us-en/blogs/cloud-computing/zeier-digital-decoupling-sap-google-cloud

English courtesy translation.
The German version is legally binding

Module title:	In-Memory und Cloud-Technologien 2
Engl. module name:	In-Memory and Cloud Technologies 2
Module level, (optional):	
Abbreviation:	IMCloud 2
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Hon. Prof. Dr. Alexander Zeier Venue: Kronberg (Frankfurt am Main)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance time = 40 h: -40 h lecture Independent work = 50 h: -50 h Preparation and follow-up of the lecture
Credit points / ECTS:	3 credit points = 3*30 h = 90 h (40 h attendance time + 50 h independent work) Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Course "Databases I" and "Databases II" - optional
Intended learning outcomes:	Learning objectives & acquired skills: -In-depth study: In-memory technology with a focus on SAP HANA
Contents:	In-memory technology and applications with a focus on SAP HANA: Development of high-availability solutions and backup strategies -Extension of the data layout without downtime -Migration approaches for projects in which in-memory databases are used Due to the provision of and access to the licensed SAP HANA system and other chargeable applications, the number of participants at the event is limited.
Type of examination:	Exam admission:

	-Participation in the event Examination form: -Written examination
Media:	
Literature:	Plattner, H., Zeier, A.: In-Memory Data Management: Technology and Applications, Springer Verlag, 2nd edition, May 2012, ISBN 978-3642295744 Whitepaper "HANA on Intel: Three Steps to Reinvent Your Enterprise as a Digital Disrupter" by Prof. Dr. Alexander Zeier & Intel CTO Enterprise Ed Goldman, 2016. Cloud Computing, Blog (July 2020) on Digital Decoupling. Title: Trapped by legacy systems, CIOs look for a way out https://www.accenture.com/us-en/blogs/cloud-computing/zeier-digital-decoupling-sap-google-cloud

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Module title:	In-Memory und Cloud-Technologien 3
Engl. module name:	In-memory and cloud technologies 3
Module level, (optional):	
Abbreviation:	IMCloud 3
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Hon. Prof. Dr. Alexander Zeier Venue: Magdeburg
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Exercise; Project
Workload:	Attendance time = 34 h: -28 h exercise -6 h Sprint Meetings Independent work = 146 h: -146 h Working on a project (within 12 weeks) oImplementation of a project with a focus on the use of an in-memory database
Credit points / ECTS:	6 credit points = 6*30 h = 180 h (34 h attendance time + 146 h independent work) Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Course "Databases I" and "Databases II" - optional Event "In-Memory and Cloud Technologies 2" - optional Course "In-Memory and Cloud Technologies 1" is mandatory
Intended learning outcomes:	Learning objectives & acquired skills: -Enabling the use of in-memory technology -knowledge about data acquisition and -modeling in SAP Hana

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	-Knowledge of programming SAP HANA applications (HTML5, Javascript, SQL) -Introduction and use of cloud technology with a focus on Google Cloud -Digital Decoupling on Cloud for SAP Systems
Contents:	In-memory technology and applications with a focus on SAP HANA: -Use of multi-core and main memory -Access pattern in the memory hierarchy -Parallel data processing using multi-core -SQL for accessing in-memory data -Active and passive data storage Google Cloud technology and services, use of e.g. Anthos, Bigquery, and AutoML. Due to the provision of and access to the licensed SAP HANA system and other chargeable applications, the number of participants at the event is limited.
Type of examination:	Participation in the exercise Oral exam at the end of the semester;
Media:	
Literature:	Plattner, H., Zeier, A.: In-Memory Data Management: Technology and Applications, Springer Verlag, 2nd edition, May 2012, ISBN 978-3642295744 Whitepaper "HANA on Intel: Three Steps to Reinvent Your Enterprise as a Digital Disrupter" by Prof. Dr. Alexander Zeier & Intel CTO Enterprise Ed Goldman, 2016. Cloud Computing, Blog (July 2020) on Digital Decoupling. Title: Trapped by legacy systems, CIOs look for a way out https://www.accenture.com/us-en/blogs/cloud-computing/zeier-digital-decoupling-sap-google-cloud

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The German version is legally binding

Module title:	Innovative Mess-und Prüftechnik
Engl. module name:	Innovative testing technology
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Molitor, FMB-IFQ
Lecturer(s):	Prof. Molitor, FMB-IFQ
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: Lectures: 2 SWS, Exercises: 1 SWS Independent work: Preparation and follow-up of courses, literature study
Credit points / ECTS:	5
Mandatory prerequisites :	Basic knowledge of manufacturing theory and metrology (manufacturing processes, basic physical and technical principles of metrology)
Recommended prerequisites:	
Intended learning outcomes:	Acquisition of knowledge about innovative measurement techniques in industrial use.
Contents:	Computer-aided optoelectronic measuring methods Integration of accelerative and camera-electronic sensors in the form of complex measuring device units Use of sensors in test bench technology Telemetry for the transmission of sensor signals Classification method in n-dimensional feature space
Type of examination:	Oral examination (30 min.)
Media:	
Literature:	

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The German version is legally binding

Module title:	Integrierte Produktentwicklung 1
Engl. module name:	Integrated Product Development 1
Module level, (optional):	
Abbreviation:	IPE 1
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Mechanical Engineering Informatics
Lecturer(s):	Professorship for Mechanical Engineering Informatics
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design FIN: B.Sc. INGINF - WPF Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 1 SWS exercise Independent work: Follow-up of the lecture, independent project and exercise work outside the actual exercise dates 4 credit points = 120 h = 3 SWS = 42 h attendance time + 78 h independent work
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	CAx basics or equivalent lecture
Intended learning outcomes:	Learning objectives & skills to be acquired: Interdisciplinary cooperation in the project team Mastering methods for finding and evaluating solutions Understanding the need for and role of an integrated approach and the pre-postponement of decisions Understanding the mutual influences and contradictions of functional fulfillment, design, quality, adherence to delivery dates and price-performance ratio Get to know relevant product properties Master dynamic forms of organization and processing (learning organizations, process networks, process navigation)
Contents:	Introduction to project work in integrated product development Evolution of product development Introduction to integrated product development Product features in integrated product development Organizational aspects of product developmentProject and process management
Type of examination:	Services: Certificate of successful project work, Exam: written (120 min)

Media:	Beamer, overhead, blackboard
Literature:	Schäppi, Radermacher, Kirchgeorg, Andreasen: Handbook of Product Development. Hanser-Verlag Munich 2005. Ehrlenspiel: Integrated Product Development. Hanser-Verlag Munich 2002

English courtesy translation.
The German version is legally binding

Module title:	Intelligent Data Analysis
Engl. module name:	Intelligent Data Analysis
Module level, (optional):	
Abbreviation:	IDA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester; M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Practical Computer Science / Computational Intelligence
Lecturer(s):	Prof. Dr. Rudolf Kruse
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Time of attendance = 56 hours: 2 SWS lecture 2 SWS exercise Bachelor: Independent work = 94 hours: Pre- and post-work for lecture and exercise Solving exercise tasks Master: Independent work = 124 hours: Pre- and post-work for lecture and exercise Solving exercise tasks additional practical exercise
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Foundations of probability theory and statistics
Intended learning outcomes:	Conveying of fundamental concepts and methods for analyzing data by means of method from intelligent systems Participants will be able to use techniques for data analysis Participants will know the most important methods for solving data analysis problems Participants will know exemplary applications and understand their mode of operation for Master: advanced competencies in scientifical research and writing

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Contents:	Different types of dataStatistical concepts of data analysisRegression analysis Clustering and classification Decision Trees Time Series Analysis Stochastic search methods
Type of examination:	Written exam, duration: 120 minutes, prerequisites: Solve at least 2/3 exercise tasks Successful presentation during exercise "Appearance" Solve at least 2/3 exercise tasks Successful presentation during exercise Pass an oral colloquium
Media:	
Literature:	Kruse, Rudolf, et al, Computational Intelligence, Springer-Vieweg, Wiesbaden, 2015 Berthold, Michael R., et al. Guide to intelligent data analysis: how to intelligently make sense of real data. Vol. 42 Springer Science & Business Media, 2010

English courtesy translation.
The German version is legally binding

Module title:	Intelligente Systeme
Engl. module name:	Intelligent Systems
Module level, (optional):	
Abbreviation:	IS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Winter semester
Module coordinator:	Professorship for Practical Computer Science / Computational Intelligence
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Self-employed work = 94 hours: Pre- and post-processing of lecture and exercise Work on exercises and programming tasks
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I to IV
Intended learning outcomes:	Ability to model and create knowledge-intensive applications by selecting problem-oriented modeling techniques Application of heuristic search methods and learning systems to cope with large amounts of data Ability to develop and evaluate intelligent and decision-support systems Evaluation and application of model approaches for the development of cognitive systems
Contents:	Properties of intelligent systems Modeling techniques for knowledge-intensive applications Subsymbolic solution methods Heuristic search methods Learning systems Model approaches for cognitive systems Knowledge revision and ontologies Decision support systems Other current methods for the development of intelligent systems such as causal networks, fuzzy reasoning
Type of examination:	Examination in written form, duration: 2 hours, necessary preliminary work will be announced in the first week of the

	course and on the lecture websiteCertificate: written or oral, necessary preliminary work will be announced in the first week of the course and on the lecture website
Media:	
Literature:	Christoph Beierle and Gabriele Kern-Isberner. Methods of knowledge-based systems (5th edition). Vieweg Publishing House, 2014. Stuart J. Russell and Peter Norvig. Artificial Intelligence: A Modern Approach (2nd edition). Pearson Studies, 2012 Rudolf Kruse et al, Computational Intelligence, 2nd edition, Springer-Vieweg, 2015

English courtesy translation.
The German version is legally binding

Module title:	Interaktive Systeme
Engl. module name:	Interactive Systems
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Applied Computer Science / Visualization
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. DIGIENG - Methods of Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture/2 SWS exercise Independent work: Follow-up of the lecture Solving exercises Project development 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures
Intended learning outcomes:	Learning objectives & acquired skills: Basic understanding of human-computer interaction Application of knowledge about human perception in the design and evaluation of user interfaces Task and user-dependent selection of interaction techniques Ability to independently design, conduct and interpret user studies Mastering usability engineering in compliance with framework conditions and resource constraints (systematically creating systems that are easy to use)

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The German version is legally binding

Contents:	Technical basics of human-computer interaction (window, menu and dialog systems) Interaction techniques and interaction tasks Cognitive foundations of human-computer interaction Analysis of tasks and users Prototype development and evaluationSpecification of user interfaces
Type of examination:	Examination prerequisites see lecture Exam: Written exam 120 min.
Media:	
Literature:	Preim/Dachselt: Interactive Systems. Springer 2010

English courtesy translation.
The German version is legally binding

Module title:	Interaktives Information Retrieval
Engl. module name:	Interactive Information Retrieval
Module level, (optional):	
Abbreviation:	IIR
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Dr.-Ing. Tatiana Gossen
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. DKE - Area Methods II
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of information retrieval
Intended learning outcomes:	Learning objectives & acquired skills: Participants gain an insight into the special features of human-machine interaction in the field of interactive information search (especially on the web) Participants can independently design and develop customized interactive information systems
Contents:	Information search models Principles of information retrieval Modeling the search (user modeling) Context and personalization Design of the user interfaces for the search User interfaces for interactive retrieval systems (e.g. for collaborative search, exploratory search) Evaluation and analysis of IIR systems using log file analysis and eye-tracking
Type of examination:	Services: Regular participation in the lectures

	Solving the exercises and successful presentation in the exercises Exam: oral (also for certificate)
Media:	Power Point, blackboard
Literature:	See website

English courtesy translation.
The German version is legally binding

Module title:	Intercultural Workshop: Studying at OvGU - Differences and Similarities in Turkish and German higher education
Engl. module name:	Intercultural Workshop: Studying at OvGU - Differences and Similarities in Turkish and German higher education
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Mesut Günes
Lecturer(s):	Prof. Mesut Günes
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF
Teaching method / weekly hours:	Block event
Workload:	30h
Credit points / ECTS:	1 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Structure of the degree program and study techniques Communication and collaboration Effective and efficient study and examination planning Studying successfully in Germany
Contents:	Study planning & successful studying Goals & goal-oriented action Time management & scheduling Think and act independently Successful semester and study planning Successful exam preparation and follow-up Cultural differences/similarities between Germany and Turkey Study-related differences/similarities between Germany and Turkey
Type of examination:	-
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Interdisziplinäres Teamprojekt
Engl. module name:	Interdisciplinary Team Project
Module level, (optional):	
Abbreviation:	ITP
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 2nd semester
Term:	every semester
Module coordinator:	supply-specific
Lecturer(s):	supply-specific
Language:	---
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Interdisciplinary team project
Teaching method / weekly hours:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 180h = 12 weeks of 14 hours each
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	supply-specific
Intended learning outcomes:	The aim of this "small" project is not only to deepen students' knowledge of the fundamentals in a complementary scientific field, but above all to develop key skills in interdisciplinary work on the basis of a defined task that is worked on by students in a team.
Contents:	This module is taught by various university lecturers implemented. The technical contents are therefore supply-specific.
Type of examination:	supply-specific
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Computer Graphics
Engl. module name:	Introduction to Computer Graphics
Module level, (optional):	
Abbreviation:	ICG
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Visual Computing
Lecturer(s):	Prof. Dr. Holger Theisel
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. VC - Visual Computing - Compulsory subjects (can only be credited if the German-language Bachelor course Computer Graphics I has not previously been taken)
Teaching method / weekly hours:	Lecture; Exercise
Workload:	In class teaching: * 2 SWS lecture / 2 SWS exercise Self-study: * Self-study of lecture material * Solution of exercises and assignments
Credit points / ECTS:	6 Credit Points = 180 h (56h in class + 124h self study), grading scheme according to exam regulations
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Acquire basic knowledge of the most important algorithms in computer graphics.Recognition of basic principles of computer graphics enables fast familiarization with new graphics packages and graphics librariesAbility to use graphical approaches for various computer science applications
Contents:	Introduction, history, application areas of Computer graphicsModeling and acquisition of graphical dataTransformationsClippingRasterization and antialiasingLightingTexturingVisibilityRay tracingModern concepts of computer graphics at a glance
Type of examination:	Exam. requirements:Successful completion of the exercisesCompleting a programming task Exam: Written exam 120 min. Exam certificate (Schein): Passing the exam

English courtesy translation.
The German version is legally binding

Media:	
Literature:	J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes: Computer Graphics - Principles and Practice (second Edition). AddisonWesley Publishing Company, Inc, 1996J.Encarnacao, W. D. Salomon: Computer Graphics Geometric Modeling, Springer, 1999A. Watt: 3D Computer Graphics. Addison-Wesley Publishing Company, Inc, 2000

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Computer Science for Engineers
Engl. module name:	Introduction to Computer Science for Engineers
Module level, (optional):	
Abbreviation:	ICSE
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Dr.-Ing. Christian Braune
Lecturer(s):	Dr.-Ing. Christian Braune
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise; Tutorial
Workload:	180 h (70 h contact hours + 110 h complementary reading and realization of the exercises/assignments)
Credit points / ECTS:	6 credit points Grades according to the examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge and Understanding: - Understand the principles of object-oriented programming. - Understand and recognize the fundamental data structures such as lists, stacks and queues, trees (binary trees, search-trees and AVL trees), hash tables and graphs. - Understand and recognize methods to observe algorithm complexity or performance. - Understand and recognize the basic algorithms for sorting and searching. - Comprehend the fundamental types of algorithm design paradigm such as Divide-and-Conquer, Greedy, Backtracking and Searching, and Dynamic Programming. Intellectual and Practical Skills: - Distinguish the different types of data structures and algorithm design paradigm evaluate when an algorithmic design situation calls for it. - Select appropriate algorithms for basic tasks such as searching and sorting. - Design new algorithms or modify existing ones for new application and reason about the efficiency of the result. - Program, test and debug computer programs in Java. Communication and Interpersonal Skills: - Presentation of work and ideas during the tutorials / exercises. - Interact with a team and tutors during the tutorials.
Contents:	

	Introduction to: - imperative programming paradigm - basic concepts of object-oriented programming - programming in a commonly used programming language (e.g. Java, Python) - generic programming - fundamental data structures: -- trees (binary trees, search-trees and AVL trees) -- hash tables -- graphs - abstract data types: lists, stacks, queues - main algorithms for fundamental tasks such as sorting and searching - methods to observe algorithm complexity or performance (Big-O notation). - fundamental types of algorithm design paradigms: Divide-and-Conquer, Greedy, Backtracking and Searching, and Dynamic Programming
Type of examination:	Prerequisites for admission: successful completion of assignments (voting & assessment) Written examination, 120 min
Media:	Git, live coding, MOOCs, bar camp
Literature:	Computer Science - An Interdisciplinary Approach, R. Sedgewick and K. Wayne, Addison-Wesley, 2016, ISBN 0-13-407642-7 Algorithms, 4th Edition, R. Sedgewick and K. Wayne, Addison-Wesley, 2011, ISBN 0-321-57351-X Data Structures and Algorithm in Java, 6th Edition, M.T. Goodrich and R. Tamassia and M.H. Goldwasser, Wiley, 2014, ISBN 1-118-77133-4

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Computer Vision
Engl. module name:	Introduction to Computer Vision
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	FIN-ISG / Chair of Image Processing/Image Understanding
Lecturer(s):	Prof. Dr. Klaus Tönnies
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Times of presence:Weekly lectures: 2 SWS project meetings: 2 SWS Home work:project development in small groups (2-3) repetition of the lecture topics 150h (56h attendance time + 94h independent work Grading scale according to examination regulations
Credit points / ECTS:	5
Mandatory prerequisites :	Active participation in the lecture and successful participation in the project
Recommended prerequisites:	Programming skills, basic knowledge in image or signal processing, basic knowledge in geometry, analysis and linear algebra.
Intended learning outcomes:	Ability to decide on suitable strategies for basic computer vision tasks Competent use of computer vision algorithms for solving multiple view problems Competent use of basic strategies to solve object detection tasks
Contents:	Feature extraction in images Multiple view geometry for stereo vision and structure from motion Object detection using templates Object tracking Introduction to image classification
Type of examination:	Oral exam
Media:	
Literature:	See http://wwwisg.cs.uni-magdeburg.de/bv/

	and there the lecture website

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Deep Learning
Engl. module name:	Introduction to Deep Learning
Module level, (optional):	
Abbreviation:	IDL
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Sebastian Stober
Lecturer(s):	Prof. Dr. Sebastian Stober
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	300h (84h contact hours + 216h self-study) contact hours: 2 SWS lecture + 2 SWS theory exercise groups + 2 SWS practice exercise groups self-study comprises reading assignments (flipped classroom), programming exercises and course project
Credit points / ECTS:	10 CP
Mandatory prerequisites :	
Recommended prerequisites:	- linear algebra and probability theory - machine learning (e.g. "intelligent systems" or "machine learning")
Intended learning outcomes:	- confidently apply DL techniques to develop a solution for a given problem - follow recent DL publications and critically assess their contributions - formulate hypotheses and design & conduct DL experiments to validate them - document progress & design decisions for reproducibility and transparency

	- for Master: advanced competencies in scientifical research in topics of the module
Contents:	- artificial neural network fundamentals (gradient descent & backpropagation, activation functions) - network architectures (convolutional neural networks, recurrent/recursive neural networks, auto-encoders) - regularization techniques - introspection & analysis techniques - optimization techniques - advanced training strategies (e.g. teacher-student)
Type of examination:	Exam requirements: participation and active involvement in the course and the exercises (defined in the 1st lecture and published on the course website) Final exam: written (120 minutes) Certificate: pass final exam (at least 4.0)
Media:	
Literature:	Ian Goodfellow, Yoshua Bengio & Aaron Courville: "Deep Learning", MIT Press, 2016.

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Numerical Ordinary and Partial Differential Equations and their Applications
Engl. module name:	Introduction to Numerical Ordinary and Partial Differential Equations and their Applications
Module level, (optional):	
Abbreviation:	WR II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	2 SWS lecture, 2 SWS exercise and self-study
Credit points / ECTS:	5 CP Grading following study and examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Linear algebra, an introduction to scientific computing (floating point numbers, numerical solution of linear systems, eigen decomposition, DFT/FFT)

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Intended learning outcomes:	The course provides an introduction to ordinary and partial differential equations and their discretization. It also considers questions such as consistency, stability and convergence with an emphasis on their practical relevance.
Contents:	- Introduction into ODEs - Initial value problems, well posed problems - Consistency, stability, convergence - Explicit and implicit time stepping methods - One-step and multi-step time stepping methods - Introduction to PDEs - Basis representations and Galerkin projection - Spectral methods and finite elements - Advection equation, Laplace equation, wave equations
Type of examination:	Passing the exam
Media:	
Literature:	- V. I. Arnold. Ordinary Differential Equations. Springer-Textbook. Springer, third ed. 1992. - A. Iserles, A First Course in the Numerical Analysis of Differential Equations, Cambridge University Press, 2009. - L. N. Trefethen, Exploring Ordinary Differential Equations, SIAM, 2017 - G. Strang, Computational Science and Engineering, Cambridge University Press, 2007.

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Robotics
Engl. module name:	Introduction to Robotics
Module level, (optional):	
Abbreviation:	ItR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Dr. Ch. Steup
Lecturer(s):	Dr. Ch. Steup
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 h 2h per week lecture = 26h 2h per Week Exercise = 26h approx. 3h Recap and Self study of Lecture per Week ~ 40h approx. 5h Preparation of Exercise Tasks~ 58h
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science Intelligent systems
Intended learning outcomes:	- Understanding the Structure of Complex Robotic Systems - Building Complex Robots and Robotic Systems from Building Blocks - Aspects of Robotic Systems and their Impact on Performance - Developing Robotic System Software using ROS - Extending Single Robot Systems to Multi-Robot Systems - Developing Application-Specific Behavior using Standard Behaviors for Navigation and Path Planning
Contents:	The lecture Introduction to Robotics will teach students the fundamental concepts of robotics from a top-down perspective, focused on mobile robots. The lecture starts with some exemplary robotic systems to show the variety of system in action today. Afterwards, multiple views on robotics systems are shown, which highlight different aspects like communication, behavior, movement, and system setup. The lecture continues with a description of multiple communication paradigms

	typically used in the robotic context and their relation to physical communication mechanisms. The next topic highlights some components typically found for perception and actuation like cameras, LiDARs, Distance Sensors, linear and revolute motors and piezo actuators. Afterwards, mechanisms to combine perception and actuation using low-level control mechanisms are shown. The shown mechanisms are reactive behaviors based on rule-sets and state-machines and feed-back-based control. Additionally, some kinematic models for movement of robots are highlighted like differential drive, Ackerman steering and holonomic movement. The next part of the lecture focus on localization of mobile robots using external mechanisms like Triangulation and Trilateration and internal mechanisms like SLAM and landmark tracking. The last two parts of the lecture discuss algorithms for path- and trajectory planning, and the extension to multi-robot systems. The exercises to the lecture will highlight the concepts of the lecture with practical examples based on robotic simulations in ROS with the Gazebo simulator.
Type of examination:	Oral Exam
Media:	
Literature:	Sebastian Thrun: Probabilistic Robotics, https://lhmdb.gbv.de/DB=1/XMLPRS=N/PPN?PPN=481815236 Steven LaValle, Planning Algorithms, https://lhmdb.gbv.de/DB=1/XMLPRS=N/PPN?PPN=481815236

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Simulation
Engl. module name:	Introduction to Simulation
Module level, (optional):	
Abbreviation:	ItS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Models department
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 hours (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I - III
Intended learning outcomes:	Ability to carry out a semester-long project using the basics of simulation, event-oriented modeling and programming, abstract modeling and applications of computer science in other subject areas
Contents:	Event-oriented simulation Random variables Random number generation Statistical data analysis ordinary differential equations Numerical integration stochastic Petri nets AnyLogic simulation system Discrete-time Markov chains Agent-based simulation
Type of examination:	Graded: Written exam, 120 min Ungraded: pass the written exam, 120 min
Media:	
Literature:	Banks, Carson, Nelson, Nicol: Discrete-Event System Simulation See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module title:	Introduction to Software Engineering for Engineers
Engl. module name:	Introduction to Software Engineering for Engineers
Module level, (optional):	
Abbreviation:	ISEE
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Dr.-Ing. Christian Braune
Lecturer(s):	Dr.-Ing. Christian Braune
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise
Workload:	2 SWS lecture (28h) 2 SWS exercise (28h) plus 94h complementary reading, preparation and project work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge and Understanding: Understand the principles of software engineering. Understand the principles of requirement engineering Understand the principles of an UML model to represent structural and behavioral aspects of a software system. Understand and recognize common design principles. Understand and recognize testing strategies for a software system. Intellectual and Practical Skills: Capture, document and analyze requirements. Translate a requirements specification into an implementable de-sign, following a structured and organized process. Design UML models to represent structural and behavioral as-pects of a software system. Design system architectures that meet the system specification. Apply testing techniques to check that a software system works correctly, i.e. meets its specification. Communication and Interpersonal Skills: Group working skills including general organization, planning, time management and presentation of work.
Contents:	Introduction to: Software Engineering Principles Requirements Engineering Unified Modeling Language (UML)

	Analysis and Design Process Design Principles Testing
Type of examination:	written exam 120min to be admitted to the exam, participation in the exercises is necessary. Details will be published in the first lecture.
Media:	
Literature:	will be published on the course's website

English courtesy translation.
The German version is legally binding

Module title:	IT-Forensik
Engl. module name:	IT Forensics
Module level, (optional):	
Abbreviation:	IFOR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Professorship of Applied Computer Science, Multimedia and Security
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann, FIN-ITI
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	4 SWS = 150h = 56h attendance time + 94h independent work
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of Algorithms and Data Structures, Fundamentals of Theoretical Computer Science, Fundamentals of Computer Engineering, "Secure Systems" module
Intended learning outcomes:	- Ability to organize, conduct, document and moderate IT forensic investigations based on a data-centric process model using a simplified example - Ability to customize, adapt and further develop IT forensic methods
Contents:	- Basics of IT forensic investigations: data-centric procedure model with information, data and phases for IT forensic investigations, application to selected examples - Security objectives, design requirements and selected legal aspects in IT forensics - Selected examples of evidence search, collection and evaluation according to best practices - Basics for the preparation, documentation and presentation of test results
Type of examination:	Examination form: presentation (presentation and final report)
Media:	
Literature:	see: https://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	IT-Projektmanagement (dual) (SPO bis 9/2023)
Engl. module name:	IT Project Management (dual)
Module level, (optional):	
Abbreviation:	IT-PM
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics I
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 14h lecture/14h exercise Independent work: 62h Preparation and follow-up of the lecture and exercise Lecture 1 SWS = 14h attendance time + 31h independent work Exercise 1 SWS = 14h attendance time + 31h independent work
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Project management techniques Practical use of project management methods Ability to apply the concepts / methods of project management learned at the practice partner and adapt them to the situation
Contents:	Project preparation: project description, definition of objectives, structural and process organization, profitability forecastProject planning: budgeting, process planning, schedule management, capacity planning, analysis of critical paths Project management: progress control, budget monitoring, documentation and reporting Project completion: project acceptance, knowledge assurance, project liquidation Project support measures: Project management tools, creativity and working techniques, configuration management Agile project management, SCRUM

Type of examination:	Written exam, 120 min certificate Presentation in cooperation with the practice partner, further preliminary work as specified at the beginning of the semester
Media:	
Literature:	Burghardt, M. (1997): Projektmanagement: Leitfaden für die Planung, Überwachung und Steuerung von Entwicklungsprojekten. 4th ed., Erlangen.

English courtesy translation.
The German version is legally binding

Module title:	IT-Projektmanagement (SPO bis 9/2023)
Engl. module name:	IT Project Management
Module level, (optional):	
Abbreviation:	IT-PM
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics I
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - Key and methodological skills WPF KWL B, WI 1.2 WI 2.1 WI 2.2
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 14h lecture/14h exercise Independent work: 62h Preparation and follow-up of the lecture and exercise Lecture 1 SWS = 14h attendance time + 31h independent work Exercise 1 SWS = 14h attendance time + 31h independent work
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Project management techniques Practical use of project management methods
Contents:	Project preparation: project description, definition of objectives, structural and process organization, profitability forecast Project planning: budgeting, scheduling, deadline management, capacity planning, analysis of critical paths Project management: progress control, budget monitoring, documentation and reporting Project completion: project acceptance, knowledge assurance, project liquidation Project support measures: Project management tools, creativity and working techniques, configuration management Agile project management, SCRUM
Type of examination:	Written exam, 120 min

	Appearance Preliminary work as specified at the beginning of the semester
Media:	Burghardt, M. (1997): Projektmanagement: Leitfaden für die Planung, Überwachung und Steuerung von Entwicklungsprojekten. 4th ed., Erlangen.
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	IT-Security of Cyber-Physical Systems
Engl. module name:	IT-Security of Cyber-Physical Systems
Module level, (optional):	
Abbreviation:	ITS-CPS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Project
Workload:	Project lecture on selected technical topics of IT security; assignment of a challenging topic for independent work on and solution of a given task 4 SWS = 2V + 2Ü (laboratory) Workload: 180h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired skills: Within the course, the student should acquire and experience knowledge of current, selected technical topics in IT security. A challenging topic is to be worked on independently in theory and practice and presented. The focus of the topics is on hardware-related issues, e.g. IoT security, automotive IT security or security considerations for industrial control and regulation systems
Contents:	Current IT security challenges and solutions for selected technical topics such as from: System, network and application security Security of bus systems Specification and formal verification of secure systems Design and realization of hardware-related security solutions
Type of examination:	Examination form: presentation (presentation and final report)

Media:	
Literature:	See: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

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The German version is legally binding

Module title:	Knowledge Engineering and Digital Humanities
Engl. module name:	Knowledge Engineering and Digital Humanities
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Ernesto De Luca
Lecturer(s):	Prof. Dr. Ernesto De Luca
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Hours of course attendance; 2 SWS lecture 2 SWS exercises Hours of self study: 124 h self study 180 h = 56 h course attendance + 124 h self-study
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Machine Learning Information Retrieval Data Science Data Mining Fundamentals of Natural Language Processing
Intended learning outcomes:	planning and development of digital infrastructures interdisciplinary work in big teams visualization of Big Data Digital Humanities project planning Programming digital tools for research

Contents:	At the beginning, only a few people could access information in a digital way. Nowadays hundreds of millions of people use information systems every day when they use a web store, a search engine or manage their e-mails. At the moment information discovery plays an important role for managing data collections, processing and identifying relevant data, and supporting users analyzing their personal interests (e.g. context, language, semantics, etc.). Data Engineering principles are important for representing, presenting and understanding data that is generated by different systems. Knowledge Engineering refers to all aspects involved in building, maintaining and using knowledge-based systems to turn passive data into exploitable knowledge. In this course the fundamentals of Data and Knowledge Engineering will be presented. The information system architecture will be explained within all its components and related application areas will be discussed. The basic concepts and more advanced techniques for natural language processing, information filtering and decision support will be shown. Furthermore, in-depth knowledge and competences in Data Science / Data Mining will be given. All the methods and techniques can be applied in Digital Humanities. This is an interdisciplinary environment, where researchers can work together. It is based on different research fields, e.g. quantitative text analysis, information retrieval, text mining, subject-specific databases, corpus linguistics, visualization of complex data structures and provides user-oriented / user-centred representations of the data that can then be further analysed hermeneutically in the humanities. At the end of the course, the students are provided within a rich and comprehensive catalogue of tools and techniques and can develop and understand information systems applying their knowledge for Data and Knowledge Engineering. They can also use machine learning techniques that can be applied for different purposes, especially for digital humanities.
Type of examination:	Prerequisite for exam will be announced at beginning of semester. Exam: written examination
Media:	
Literature:	

Module title:	Kognitive Systeme
Engl. module name:	Cognitive Systems

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The German version is legally binding

Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	Summer semester
Module coordinator:	Prof. Dr. rer. nat. Andreas Wendemuth (FEIT-IESK)
Lecturer(s):	Prof. Dr. rer. nat. Andreas Wendemuth (FEIT-IESK)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Seminar
Workload:	Attendance time: 3 SWS Seminar Independent work: Solving the practical tasks, preparing the presentation 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	Digital signal processing
Intended learning outcomes:	The participant understands the principles of cognitive intelligence and their transfer to computer programs. They can practically implement such programs apply.
Contents:	Practical application of cognitive intelligent systems and their conception and organizational form practically tested theories and artificial representatives of human cognition Modeling in acoustic and written language as the highest representation model Implementation in engineering systems Aspects of meaning assignment and data handling in cognitive systems
Type of examination:	Unit
Media:	
Literature:	

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The German version is legally binding

Module title:	Kommunikationstechnik für Digital Engineering
Engl. module name:	Kommunikationstechnik für Digital Engineering
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 2nd semester
Term:	
Module coordinator:	Prof. Omar, FEIT-IESK
Lecturer(s):	Prof. Omar, FEIT-IESK
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 6 SWS Weekly lectures and exercises Independent work 240 h (84 h attendance time + 156 h independent work)
Credit points / ECTS:	8
Mandatory prerequisites :	Mathematics, physics, fundamentals of electrical engineering References: see script
Recommended prerequisites:	
Intended learning outcomes:	Introduction to communication technology Concepts of information, information-carrying signals, modulation, noise, transmission channels, channel capacity and source and channel coding Development of mathematical models for the treatment of the above concepts Description and quantitative treatment of information transmission systems engineering decision bases for the design of information transmission systems Information and coding theory information-theoretical concepts of information content, entropy, redundancy, source coding, channel capacity, channel coding, Hamming space and Hamming distance. mathematical models for the above concepts. Method for source and channel coding. Treatment of selected error-correcting decoding methods
Contents:	Introduction to communication technology Mathematical representation of signals as information carriers in the time and frequency domain (Fourier series and Fourier transformation) Sampling theory and the digitization of signals Source coding and data compression Mathematical description of the noise Noise behavior of the transmission channels; calculation of the bit error rate

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	Treatment of selected digital transmission systems in the baseband (PCM, DPCM, ...) Treatment of selected digital transmission systems in the passband (ASK, PSK, FSK, QAM, ...) Information and coding theory Information content and entropy of discrete information sources. Redundancy, memory and source coding (Shannon-Fano and Huffmann methods). Continuous sources. Discrete and continuous channels, channel entropies and channel capacity Channel coding and Hamming space Linear block codes Cyclic codes Syndrome decoding
Type of examination:	Examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Laborrotation in Neurobiologischer Lernforschung
Engl. module name:	Lab Rotation in neurobiological learning research
Module level, (optional):	
Abbreviation:	LR NL
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester
Term:	
Module coordinator:	Dr. André Brechmann, LIN
Lecturer(s):	Dr. André Brechmann, LIN
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing
Teaching method / weekly hours:	Internship
Workload:	Attendance time: 60 h Project Pre- and post-processing of the project 90h = 60h attendance time + 30h independent work
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Participation in the seminar "Experimental approaches in neurobiological learning research"
Intended learning outcomes:	Learning objectives & skills to be acquired: Practical experience of approaches to neurobiological research on humans or animals, including reinforcement learning, sequence learning, category learning, short-term memory processes
Contents:	As part of ongoing research projects at the Leibniz Institute, we are working on the development and implementation of neurobiological learning experiments using fMRI, MEG, EEG and electrophysiology. The main focus of data evaluation is the time series analysis of neuronal and behavioral data
Type of examination:	Exam: Oral exam
Media:	
Literature:	see https://iwebdav.ifn-magdeburg.de/iwebdav/LearningAndMemorySeminar/

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The German version is legally binding

Module title:	Learning Generative Models
Engl. module name:	Learning Generative Models
Module level, (optional):	
Abbreviation:	LGM
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	FIN: Chair of Practical Computer Science / Artificial Intelligence
Lecturer(s):	FIN: Prof. Dr.-Ing. Sebastian Stober
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Bachelor: Independent work = 94 hours: Preparation and follow-up of lectures (flipped classroom) and exercises, Working on exercises and programming tasks, course project Master: Independent work = 124 hours: Preparation and follow-up of lectures (flipped classroom) and exercises, Working on exercises and programming tasks, course project, additional project work
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to Deep Learning

Intended learning outcomes:	confidently apply generative models to develop a solution for a given problem follow recent publications on generative models and critically assess their contributions formulate hypotheses and design & conduct experiments with generative models to validate them document progress & design decisions for reproducibility and transparency
Contents:	Training methods & architectures for generative models, in particular Restricted and Deep Boltzmann Machines (RBMs and DBMs), Deep Belief Nets (DBNs), Autoregressive Models, Variational Learning and Generative Adversarial Nets (GANs)
Type of examination:	Examination in oral form Announcement of the necessary preliminary work in the first week of the course and on the lecture website Schein (oral), Announcement of the necessary preliminary work in the first week of the course and on the lecture website
Media:	
Literature:	Ian Goodfellow, Yoshua Bengio & Aaron Courville: "Deep Learning", MIT Press, 2016. Additional further reading will be announced on the course website.

English courtesy translation.
The German version is legally binding

Module title:	Lindenmayer-Systeme
Engl. module name:	Lindenmayer Systems
Module level, (optional):	
Abbreviation:	L-systems
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	
Module coordinator:	Dr. Bernd Reichel
Lecturer(s):	Dr. Bernd Reichel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 15 x 4h = 60h Independent follow-up of the lecture: 90h
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Lecture: Fundamentals of Theoretical Computer Science I
Intended learning outcomes:	Learning objectives & acquired skills: Knowledge of important classes of L-systems, Skills for meaningful application
Contents:	Definitions of different variants of L-systems; theoretical results on generation powers, complexity considerations, growth functions, etc; Applications in computer graphics (generation of fractals, modeling of plants)
Type of examination:	Oral examination lasting 30 minutes, for Schein: interview lasting 30 minutes, No admission requirement
Media:	Grzegorz Rozenberg, Arto Salomaa: The Mathematical Theory of L Systems. Academic Press, New York, 1980. Przemyslaw Prusinkiewicz, Aristid Lindenmayer: The Algorithmic Beauty of Plants. Springer-Verlag, New York, 1990.
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Liquid Democracy -> "Digitization of politics - politics of digitization"
Engl. module name:	Liquid Democracy -> "Digitization of Politics - Politics of Digitization"
Module level, (optional):	
Abbreviation:	LiquiD
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Dr.-Ing. Eike Schallehn
Lecturer(s):	Dr.-Ing. Eike Schallehn, Dr.rer. pol. Frank Lesske
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Seminar
Workload:	Attendance times: 4 SWS weekly lecture / seminar / project planning Independent work: Reviewing the lecture Preparation of seminar presentations Written elaboration of the term paper5 Credit Points = 150 h (2*28h attendance time + 94h independent work) 6 credit points = 180 h (2*28h attendance time + 124h independent work)
Credit points / ECTS:	5 or 6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Basic understanding of current concepts of participatory and deliberative democracy Knowledge of fields of application and possibilities of information systems in democratic processes Mastery of specific information systems to support democratic processes
Contents:	Fundamentals of the concept of democracy: representative vs. direct democracy Current concepts of participatory democracy: liquid democracy, proxy/ delegated voting, etc. Concepts of community/societal decision-making and decision-making processes

	Support through information systems such as LiquidFeedback, Adhocracy, etc.
Type of examination:	Presentation and term paper
Media:	
Literature:	Current literature references in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Logic for knowledge representation
Engl. module name:	Logic for knowledge representation
Module level, (optional):	
Abbreviation:	KR
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Till Mossakowski
Lecturer(s):	Till Mossakowski
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Logic
Intended learning outcomes:	Knowledge of different formalisms for knowledge representation Ability to choose a formalism for a given problem at hand Ability to formalize knowledge in a suitable formalism Understanding of representation and reasoning capabilites of the different formalisms
Contents:	Horn Logics and Datalog Description Logics and Knowledge graphs Nonmonotonic Reasoning Inconsistency handling Reasoning Uncertainty

Type of examination:	Admission prerequisites: regular participation in lecture and exercise, successful completion of the exercises Form of examination: oral
Media:	
Literature:	Franz Baader, Ian Horrocks,Carsten Lutz, Uli Sattler. An Introduction to Description Logic, Cambridge University Press 2017. Frank van Harmelen, Vladimir Lifschitz and Bruce Porter (Eds). Handbook of Knowledge Representation. Foundations of Artificial Intelligence, 2008. Pascal Hitzler, Markus Kroetsch, and Sebastian Rudolph. Foundations of Semantic Web Technologies. Chapman & Hall/ CRCTextbooks in Computing, 2009.

English courtesy translation.
The German version is legally binding

Module title:	Logik
Engl. module name:	Logic
Module level, (optional):	
Abbreviation:	Logic
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Theoretical Computer Science
Lecturer(s):	Prof. Dr. Till Mossakowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 14 X 4h = 56 h Independent follow-up of the lecture: 64 h
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	be able to explain the terms relevant to logic and their definitions, understand logical syntax, be able to read logical formulas and arguments, be able to describe situations using logical formulas, translate logical formulas into German and vice versa, Recognize and produce normal forms, situation as a model-theoretical structure, be able to distinguish between formal representation and meaning (real world/application), be able to check arguments for logical conclusions, Be able to construct proofs according to a given scheme and also independently, be able to use algorithms to evaluate and transform logical expressions and arguments
Contents:	Fields of application for logic in computer science, Logical syntax (formula concept and argument concept for propositional logic and predicate logic), formal representation of knowledge, Logical semantics of two- and three-valued propositional logic and predicate logic, Domain-specific languages and abstraction to general logical languages, Concept of inference and logical inference,

	Rule systems (e.g. for formulas and proofs), Basic algorithms for logical problems (SAT solving, Horn formula algorithm, conversion to normal forms)
Type of examination:	Admission requirement: 2 thirds of the exercises voted Exam: Written exam 120 min. Schein: preliminary work as specified at the beginning of the semester
Media:	
Literature:	J. Barwise, J. Etchemendy: Language, proof and logic. Dassow : Logic for computer scientists Schöning : Logic for computer scientists J. Kelly: Logic (in plain language)

English courtesy translation.
The German version is legally binding

Module title:	Logik für Wirtschaftsinformatiker
Engl. module name:	Logic for business informatics
Module level, (optional):	
Abbreviation:	Logic-WInf
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Theoretical Computer Science
Lecturer(s):	Prof. Dr. Till Mossakowski
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 14 X 4h = 56 h Independent follow-up of the lecture: 64 h Additional task: 30h
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	be able to explain the terms relevant to logic and their definitions, understand logical syntax, be able to read logical formulas and arguments, be able to describe situations using logical formulas, translate logical formulas into German and vice versa, Recognize and produce normal forms, situation as a model-theoretical structure, be able to distinguish between formal representation and meaning (real world/application), be able to check arguments for logical conclusions, Be able to construct proofs according to a given scheme and also independently, be able to use algorithms to evaluate and transform logical expressions and arguments
Contents:	Fields of application for logic in computer science, Logical syntax (formula concept and argument concept for propositional logic and predicate logic), formal representation of knowledge, Logical semantics of two- and three-valued propositional logic and predicate logic, Domain-specific languages and abstraction to general logical languages, Concept of inference and logical inference, Rule systems (e.g. for formulas and proofs), Basic algorithms for logical problems (SAT solving, Horn formula algorithm, conversion to normal forms)

Type of examination:	Admission requirement: 2 thirds of the exercises voted Exam: 120-minute written exam Additional work for the fifth CP compared to "Logic": by arrangement Certificate: preliminary work as specified at the beginning of the semester
Media:	
Literature:	J. Barwise, J. Etchemendy: Language, proof and logic. Dassow : Logic for computer scientists Schöning : Logic for computer scientists J. Kelly: Logic (in plain language).

English courtesy translation.
The German version is legally binding

Module title:	Logik II: Theorie und Anwendungen
Engl. module name:	Logic II: Theory and Applications
Module level, (optional):	
Abbreviation:	Logic2
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Chair of Theoretical Computer Science
Lecturer(s):	Dr. Bernd Reichel
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture (3 SWS), exercise (1 SWS) Independent work: following up on lectures, working on exercises 150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Logic module
Intended learning outcomes:	Basic understanding of concepts of various important logical systems, ability to apply these concepts in computer science.
Contents:	Summary of propositional logic, Horn logic, predicate logic, equational logic, modal logic, temporal logic, program logic, other logical systems, Hilbert calculi
Type of examination:	Examination requirements: see lecture, examination: oral
Media:	
Literature:	M. Kreuzer, S. Kühling: Logik für Informatiker, Pearson Studium, Munich, 2006, et al.

English courtesy translation.
The German version is legally binding

Module title:	Logistikprozessanalyse
Engl. module name:	Logistikprozessanalyse
Module level, (optional):	
Abbreviation:	L3
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Logistics
Lecturer(s):	Prof. Dr.-Ing. habil. Dr.-Ing. E. h. Michael Schenk, Dr.-Ing. Elke Glistau
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering Specializations - Mechanical Engineering Specialization Logistics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Weekly lecture 2 SWS 14 daily exercise 1 SWS Independent work: Exercises and exam preparation Document processing 150 h (42 h attendance time + 108 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Modules L1, L2 (Technical Logistics)
Intended learning outcomes:	Learning objectives & skills to be acquired: As a controller and consultant, the training focus of module L3 is on identifying and proving errors and weak points in logistics processes and systems on the one hand, and on recognizing potential and trends on the other, in order to subsequently derive suitable improvement measures in the strategic, tactical and operational areas, implement them and monitor their effectiveness.
Contents:	The starting point is data collection. The general focus here is on minimizing the effort required, while at the same time ensuring that the data material is up-to-date and representative. The methodological procedure for carrying out goods-related, resource-related and flow system analyses is explained in classroom sessions. Sample tasks are used to train the calculation of basic statistical parameters and key figures as well as their interpretation. Analytical methods of quality management are also used, especially for visualization and interpretation (from tally lists to Ishikawa diagrams). The range of methods is supplemented by forecasting methods (including regression) and classification methods (including cluster analysis). Business reengineering and kaizen techniques are explained to derive improvement measures and the role and

	usability of benchmarking to identify best practices are discussed. Preventive methods form the conclusion. They can be used to plan new logistics processes and systems as well as to optimize existing ones. They are essentially used to systematically record customer requirements in order to quantify the target values for logistics services (QFD) and subsequently initiate the correct (effective and efficient) measures for error prevention (Poka Yoke, SPC) by researching potential error possibilities (FMEA) and their dependencies. The individual assignment accompanying the semester includes the independent determination of relevant key figures from the procurement area, their calculation and subsequent interpretation using e-learning.
Type of examination:	Proof of participation in the exercises; Quality of the processed document task Written exam at the end of the module
Media:	
Literature:	Lecture notes in the password-protected download area

English courtesy translation.
The German version is legally binding

Module title:	Mainframe Computing
Engl. module name:	Mainframe Computing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Institute for Simulation and Graphics, AG Lehramt
Lecturer(s):	Dr. Volkmar Hinz
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 2 SWS exercise Independent work: Exercises, programming document 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Programming skills C/C++, JAVA
Intended learning outcomes:	Basic understanding of mainframe computer systems, in particular IBM "System z" Insight into the operation of IBM mainframe systems under the operating systems z/VM and z/OS Basic knowledge of the COBOL programming language and the REXX scripting language Ability to develop simple applications
Contents:	The term "mainframe" History of the IBM mainframe architecture The IBM "System z" System z emulations for developers Operating systems z/VM and z/OS as well as Linux Programming (introduction to Cobol and REXX) Application programming
Type of examination:	Examination requirements: see lecture Exam: oral
Media:	
Literature:	http://lehramt.cs.uni-magdeburg.de/Skripte/Pra/indexibm Udo Kebschull, Paul Herrmann, Wilhelm G: Spruth: Introduction to z/OS and OS/390. ISBN 3-486-27214-4.

English courtesy translation.
The German version is legally binding

Module title:	Management of Global Large IT-Systems in International Companies
Engl. module name:	Management of Global Large IT-Systems in International Companies
Module level, (optional):	
Abbreviation:	MGLIIC
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Dr. Horstfried Läpple, Dipl. Math. Karl-Albert Bebber
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture
Workload:	Attendance times (block courses): Lectures Exercises Independent work: Independent work on the exercises follow-up of lectures, - exam preparation 180h (56h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge about IT-Systems and Business administration
Intended learning outcomes:	To gain a comprehensive understanding about to develop, to implement, to operate and to phase-out of large-scale IT-Systems in international companies
Contents:	IT relevant characteristics of International Companies Organizational Structures in International Companies Critical Design decisions for IT Landscapes Hybrid IT Landscapes: DBMS and flat files Differences business and research IT Global vs. Local: Processes, Settings, Data, Landscapes Global, regional, local systems considering user's and customer's view Running a System Landscape: Support Processes, Costs and Changes Management Risk Management (Projects, IT Departments)

English courtesy translation.
The German version is legally binding

	Auditing of IT Systems and IT Projects International Project Management / Global Collaboration
Type of examination:	Examination requirements: Registration and participation in the lectures and exercises Exam: written
Media:	
Literature:	Listings

English courtesy translation.
The German version is legally binding

Module title:	Marketing
Engl. module name:	Marketing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester
Term:	Summer semester
Module coordinator:	Professorship for Marketing
Lecturer(s):	Professorship for Marketing
Language:	German
Assignment to the curriculum:	FIN: B.Sc. WIF - WPF Understanding & Design
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 1 SWS exercise 5 x30h (42 h attendance time + 108 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Acquire basic knowledge of the function of marketing in companies and the analysis of markets, Get to know the instruments of marketing, Develop skills to create a marketing plan and to solve marketing problems using appropriate methods.
Contents:	The marketing concept Market structures and buyer behavior Marketing planning and marketing mix decisions Market research Marketing organization.
Type of examination:	Written exam (60 minutes)
Media:	
Literature:	Homburg, Ch./Krohmer, H.: Marketingmanagement, 2nd edition, Wies-baden, Gabler-Verlag, 2006.

English courtesy translation.
The German version is legally binding

Module title:	Maschinelles Lernen
Engl. module name:	Machine Learning
Module level, (optional):	
Abbreviation:	ML
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture: 2 SWS / weekly exercise: 2 SWS Independent work: Completion of exercises; follow-up of the lecture, preparation for the exam150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Prerequisites for participation: "Algorithms and Data Structures"
Intended learning outcomes:	Introduction to function learning; introduction to concept spaces and concept learning; algorithms for instance-based learning and cluster analysis; algorithms for building decision trees; Bayesian learning; neural networks; association analysis; reinforcement learning; hypothesis evaluation.
Contents:	Introduction to function learning; introduction to concept spaces and concept learning; algorithms for instance-based learning and cluster analysis; algorithms for building decision trees; Bayesian learning; neural networks; association analysis; reinforcement learning; hypothesis evaluation.
Type of examination:	Services:

	Completion of the exercisesCompletion of the programming tasksSuccessful presentation of the results in the exercises Written exam (also for certificate) Preliminary work as specified at the beginning of the semester
Media:	Powerpoint, blackboard
Literature:	Tom Mitchell. Machine Learning. McGraw-Hill, 1997. S. Russel and P. Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Englewood Cliffs, 2003

English courtesy translation.
The German version is legally binding

Module title:	Masterarbeit
Engl. module name:	Master Thesis
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 3rd/4th semester
Term:	every semester
Module coordinator:	University lecturer at FIN
Lecturer(s):	University lecturer at FIN
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV FIN: M.Sc. DIGIENG FIN: M.Sc. DKE FIN: M.Sc. INF FIN: M.Sc. INGINF FIN: M.Sc. VC FIN: M.Sc. WIF
Teaching method / weekly hours:	Master's thesis, colloquium
Workload:	20 weeks Independent preparation of a scientific paper + colloquium
Credit points / ECTS:	30
Mandatory prerequisites :	Proof of 120 CP from the focus areas
Recommended prerequisites:	
Intended learning outcomes:	The aim is to provide evidence that a scientific question from a field of computer science can be worked on under supervision using scientific methods within a specified period of time and that new findings can be obtained. On successful completion of the module, students are also able to present and defend solutions to problems they have developed themselves in a structured manner.
Contents:	The topic of the Master's thesis can be derived from current research projects at the institutes or from operational problems of a scientific nature. The assignment is always issued by a university lecturer from the Faculty of Computer Science. In the colloquium, students must prove that they are able to defend the results of their scientific work in a specialist discussion. In the colloquium, the topic of the Master's thesis and the associated problems and findings are to be presented in a lecture and related questions answered.
Type of examination:	Passed colloquium
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Materialflusstechnik II
Engl. module name:	Materialflusstechnik II
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Jun.-Prof. A. Katterfeld, (further lecturers: Hon.-Prof. K. Richter), FMBILM
Lecturer(s):	Jun.-Prof. A. Katterfeld, (further lecturers: Hon.-Prof. K. Richter), FMBILM
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture; 1 SWS exercise Independent work: Exercises, exam preparation 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	Technical mechanics, construction elements Desirable: Mathematics Statistics
Intended learning outcomes:	Ability to select conveying and storage equipment as a planning component for logistics systems Assessment of operating conditions and areas of suitability Learning dimensioning techniques Design and performance determination as well as the definition of functional order and procurement specifications
Contents:	Basics of the design, function and interlinking capability of selected conveyor machines Dimensioning of the main drives, formulation of decisive selection criteria and order details, recalculation of offers and comparison of variants
Type of examination:	Participation in lectures and exercises; solving the exercises and successful presentations in the exercises; passing an oral or written exam (written exam 90 min)
Media:	
Literature:	Conveying Technology - Elements and Drives; Conveying Machines (Ed.: Scheffler)

English courtesy translation.
The German version is legally binding

Module title:	Materialflusstechnik und Logistik
Engl. module name:	Materialflusstechnik und Logistik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Hon. Prof. Dr. K. Richter / Prof. Dr. H. Zadek
Lecturer(s):	Hon. Prof. Dr. K. Richter / Prof. Dr. H. Zadek
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture
Workload:	Attendance time: 56 hours, self-study: 124 hours
Credit points / ECTS:	6
Mandatory prerequisites :	Technical mechanics, design elements (desirable: mathematics statistics)
Recommended prerequisites:	
Intended learning outcomes:	Ability to take a holistic view and to abstract and problem-adequately model logistical systems and material, informational and monetary flows Learning of generally valid basic concepts and classification systems of concepts, objects and processes Learning techniques for the qualitative and qualitative description of logistical systems, effective processes and processes to specific real-life conditions and situations Ability to select conveying and storage equipment as a planning component for logistics systems, assessment of operating conditions and areas of expediency Learning techniques for dimensioning, design and performance determination as well as the definition of functional order and procurement specifications
Contents:	Conceptual content and classification: service, value creation Basic models: graph, system, process, state model, control loop Material flow models: flow description, behavior models Logistical flow objects: Information, goods Images of goods suitable for logistics: packaging and packages, loading units, labeling Basics of the design, function and interlinking capability of selected conveyor machines Dimensioning of the main drives, formulation of decisive selection criteria and order details, recalculation of offers and comparison of variants
Type of examination:	Exercise certificate, written exam 90 minutes
Media:	

Literature:	Conveying Technology - Elements and Drives; Conveying Machines (Ed.: Scheffler) Fundamentals of Logistics (Eds.: H. Krampe, J. Lucke, Hussverlag, 2006) Gudehus, T.: Logistics: Fundamentals, Strategies, Applications. Springer 2005 Logistics Handbook. Edited by: D. Arnold. Springer 2002

English courtesy translation.
The German version is legally binding

Module title:	Mathematik I (Lineare Algebra und analytische Geometrie)
Engl. module name:	Mathematik I (Lineare Algebra und analytische Geometrie)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Geometry
Lecturer(s):	Professorship for Geometry
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Understanding
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times 84h: SWS Lecture SWS Exercises Independent work 156h: Processing the weekly exercise sheets, exam preparation 240h =84h attendance time + 156h independent work
Credit points / ECTS:	8
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Acquisition of the knowledge of concepts and structures from linear algebra and geometry required for studying IF, CV, Ing-IF and WIF Acquisition of skills in solving problems from linear algebra and geometry
Contents:	Algebra: Sets, relations and mappings, vector spaces, linear systems of equations, linear mappings and matrices, Determinants, eigenvalues and eigenvectors Geometry: basics of affine and projective geometry, homogeneous coordinates and transformations
Type of examination:	Exam: Written (120 min)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Mathematik II (Algebra und Analysis)
Engl. module name:	Mathematik II (Algebra und Analysis)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Professorship for Geometry
Lecturer(s):	Professorship for Geometry
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - Understanding
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times 84h: SWS Lecture SWS Exercises Independent work 156h: Processing the weekly exercise sheets, exam preparation 240h =84h attendance time + 156h independent work
Credit points / ECTS:	8
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Acquisition of skills in abstract and structural thinking based on algebraic structures and their properties Learning algebraic methods Acquisition of the necessary basic analytical knowledge and basic analytical skills for functions with one or more variables
Contents:	Algebra: Algebraic structures and their properties: groups, rings and solids, factor structures and homomorphism Analysis I: sequences and series, differential and integral calculus for functions with one and more variables, power series and their circle of convergence Analysis II: Differential and integral calculus of functions with several variables
Type of examination:	Exam: Written (120 min)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Mathematik III (Stochastik, Statistik, Numerik, Differentialgleichungen)
Engl. module name:	Mathematik III (Stochastik, Statistik, Numerik, Differentialgleichungen)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Geometry
Lecturer(s):	Professorship for Geometry
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. INF - Core subjects FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times 70h: SWS Lecture SWS Exercises Independent work 110h: Processing the weekly exercise sheets, exam preparation180h =70h attendance time + 110h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Learning typical stochastic and statistical concepts and developing skills and abilities, to work on practical tasks in stochastics and statistics Acquisition of the basic knowledge required for numerical mathematics, development of skills in solving numerical problems Acquisition of basic knowledge and skills for solving differential equations
Contents:	Stochastics: Discrete and continuous random variables and their distribution functions, limit theorems, modeling Statistics: descriptive statistics, confidence intervals and testing of hypotheses, statistical data analysis, regression, correlation and variance analysis Numerics: interpolation by polynomials, numerical integration, numerics of linear systems of equations, zeros of non-linear equations

	Differential equations: Fundamentals of n'th order ordinary differential equations: elementary explicit solution methods and initial value problems
Type of examination:	Exam: Written (120 min)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Mechanische Schwingungen, Struktur- und Maschinendynamik
Engl. module name:	Mechanische Schwingungen, Struktur- und Maschinendynamik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Strackeljan, IFME
Lecturer(s):	Prof. Strackeljan, IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercises independent work: Follow-up of the lecture, independent exercise work and creation of simulation programs as a project Lectures and exercises using Matla programs
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Prerequisites for participation: Basic knowledge of mechanics and dynamics incl. vibrations
Intended learning outcomes:	Learning objectives and skills to be acquired: Implementation of real problems from the field of machine dynamics in mechanical equivalent models based on concrete questions of mechanical engineering Students should be able to work on fundamental problems in the field of vibration and structural dynamics and find solutions to them Ability to map real systems to manageable mechanical models, the mathematical modeling of vibrating mechanical systems and the determination of the dynamic properties of structures, the calculation of solutions and their interpretation Use of numerical methods and program systems to simulate vibration problems, including own exercises Ability to evaluate the results of such calculations
Contents:	Repetition of basic oscillation phenomena Treatment of systems with multiple FG Applications in mechanical engineering, automotive engineering, torsional vibrations, vibration damping Balancing of rigid and flexible rotors Oscillations of simple continua Vibrations of rotor systems, determination of speed-dependent natural frequencies Self-excited and parameter-excited oscillations Numerical methods, MKS systemsIntroduction to non-linear vibration problems

English courtesy translation.
The German version is legally binding

Type of examination:	Creation of a project, oral examination
Media:	
Literature:	Lecture notes with extensive information on further reading

English courtesy translation.
The German version is legally binding

Module title:	Mechatronik der Werkzeugmaschinen
Engl. module name:	Mechatronics of machine tools
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Möhring, FMB-IFQ
Lecturer(s):	Prof. Möhring, FMB-IFQ
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS Independent work: Follow-up of lectures
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives and skills to be acquired: Knowledge and understanding of the mechatronic machine tool system Knowledge of the mechatronic core components of cutting machine tools and how they work Knowledge of the design and calculation of system behavior Ability to assess cutting machine tools
Contents:	Classification of machine tools and the machine tool mechatronic system The cutting machine tool as high-performance and precision mechatronics Core components: Mechanical structures, guides and bearings, electrical and electromechanical drive technology, power electronics, measuring systems, control technology Design, calculation and simulation methods: Analytical methods, finite element calculation, multi-body simulation, mechatronic simulation Machine dynamics of cutting machine tools Control of cutting machine tools Metrological analysis and evaluation of the mechatronic behavior of cutting machine tools Process behavior of cutting machine tools Future technologies in mechatronic machine tools: Materials, actuators, sensors, control methods, simulation methods
Type of examination:	Exam: Written exam (K120)
Media:	

Literature:	Weck, M.; Brecher, C.: Werkzeugmaschinen, Band 1-5, Springer Verlag Tönshoff, H.K.: Werkzeugmaschinen - Grundlagen, Springer Verlag Heimann, B.; Gerth, W.; Popp, K.: Mechatronik, Fachbuchverlag Leipzig Rieg, F.; Hackenschmidt, R.: Finite Elemente Analyse für Ingenieure, Hanser Verlag Dresig, H.; Holzweißig, F.: Maschinendynamik, Springer Verlag Hering, E.; Bressler, K.; Gutekunst, J.: Elektrotechnik für Ingenieure und Naturwissenschaftler, Springer Verlag Lutz, H.; Wendt, W.: Taschenbuch der Regelungstechnik, Verlag Harri Deutsch

English courtesy translation.
The German version is legally binding

Module title:	Mechatronische Aktoren und Sensoren
Engl. module name:	Mechatronic Actuators and Sensorees
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Kaspar, FMB-IMS
Lecturer(s):	Prof. Kaspar, FMB-IMS
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, independent work: Follow-up of the lecture, solving test tasks
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Mechatronic Systems II
Intended learning outcomes:	Learning objectives and skills to be acquired Design and function of mechatronic actuators and sensors and their integration into mechatronic systems Application of mechatronic actuators and sensors, especially in the areas of vehicles and mobile systems
Contents:	Introduction of capacitive and inductive actuators and sensors Electrical control of capacitive and inductive actuators Calculation and control of capacitive and inductive actuator systems Evaluation circuits for capacitive and inductive sensors Integrated sensor-actuator systems Applications Position or force point valves, variable valve train, injection valves, mechatronic brakes, wedge brakes, mechatronic actuation and handling systems Vibration damping Chassis, bearings, engine mounts, structural vibrationsMagnetic bearings
Type of examination:	Admission prerequisite: Participation in the exercises Exam: oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Medizinische Bildverarbeitung
Engl. module name:	Medical Image Processing
Module level, (optional):	
Abbreviation:	MedBV
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Professorship for Practical Computer Science / Image Processing, Image Understanding
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application Subject - Medical Technology FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FEIT: BSc Medical Technology: compulsory, 4th semester
Teaching method / weekly hours:	Lecture; Project
Workload:	Attendance times: 2 SWS Lecture 2 SWS Project meeting Independent work: Project planning and implementation in teams Preparation of the project presentation Preparation and follow-up of the lecture material 150h = 4SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science, linear algebra, basic knowledge of digital image processing
Intended learning outcomes:	Learning objectives & skills to be acquired: Ability to apply algorithms to analyze digital images Ability to work independently on a small project Ability to work in a team Ability to work in an interdisciplinary manner
Contents:	Digital images in medicine Communication and storage of digital images in hospitals Validation methods for image analysis methods Advanced image enhancement methods Advanced segmentation methods Image registration

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The German version is legally binding

Type of examination:	Examination prerequisite is required Exam: written 120 min
Media:	
Literature:	see http://wwwisg.cs.uni-magdeburg.de/bv/mba/mba.html

English courtesy translation.
The German version is legally binding

Module title:	Medizinische Visualisierung
Engl. module name:	Medical Visualization
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Visualization
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science MSc MSE
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Lecture and lecture-accompanying exercise including a programming practical with the MeVisLab library, independent work on the exercises as a prerequisite for admission to the examination Attendance times: weekly lectures and exercises 2 SWS each Independent work: Independent work on exercises and follow-up work on lectures, exam preparation 180h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Computer Graphics I, Visualization
Intended learning outcomes:	Using the example of medical applications, this lecture provides basic knowledge about how large amounts of data can be visualized, explored and specifically analysed. The data volumes are medical slice images, mainly computer tomography and magnetic resonance imaging data, which are generated in radiology. Various visualization techniques are considered in terms of how specific medical questions can be supported in diagnosis and therapy planning. However, prior medical knowledge is not required
Contents:	Characterization of medical layer data Algorithms for medical visualization Interaction techniques in medical visualization Virtual endoscopy Concepts and systems of computer-aided anatomy training Visualization of vascular structures and blood flow data

English courtesy translation.
The German version is legally binding

Type of examination:	Examination prerequisites: Will be announced at the beginning of the semester. Exam: oral
Media:	
Literature:	B. Preim and D. Bartz: Visualization in Medicine, Morgan Kaufman, San Francisco, 2006Preim, Botha: Visual Computing for Medicine, 2nd Edition, , Morgan Kaufman, San Francisco, 2013

English courtesy translation.
The German version is legally binding

Module title:	Mesh processing
Engl. module name:	Mesh processing
Module level, (optional):	
Abbreviation:	MP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Visual Computing
Lecturer(s):	Dr. Christian Rössl
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - Application subject - Computer games FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Exercises 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I and Mathematics II (linear algebra and analysis), computer graphics
Intended learning outcomes:	Learning objectives & skills to be acquired: Function and implementation of algorithms on triangular networks using suitable data structures
Contents:	3D scanning and triangulationData structureDiscrete differential geometry Smoothing Parameterization Decimation Remeshing

	Deformation
Type of examination:	Examination prerequisites: Regular participation in the course, successful completion of the exercises Oral examination
Media:	
Literature:	http://www.pmp-book.org/

English courtesy translation.
The German version is legally binding

Module title:	Methoden des Virtual Engineering in der Mechanik
Engl. module name:	Methods of Virtual Engineering in Mechanics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Gabbert, FMB-IFME
Lecturer(s):	Prof. Gabbert, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture 3 SWS, exercise 1 SWS Independent work on a project
Credit points / ECTS:	5
Mandatory prerequisites :	Knowledge of technical mechanics; computer science
Recommended prerequisites:	
Intended learning outcomes:	Knowledge of software development Application of commercial software tools to solve complex calculation problems in mechanics
Contents:	Use of high-performance computers (PC clusters, supercomputers), use of parallel computers (MPI) Software development methods Data formats, data structures, data interfaces Software tools, coupling of different software tools Graphic programming; programming exercises
Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Middleware für verteilte industrielle Umgebungen
Engl. module name:	Middleware für verteilte industrielle Umgebungen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Dr. Matthias Riedl, ifak e.V. Magdeburg
Lecturer(s):	Dr. Matthias Riedl, ifak e.V. Magdeburg
Language:	German
Assignment to the curriculum:	FIN: M.Sc. INF - Computer Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises: 2 SWS Independent work: Reviewing the lecture Solving exercises with increasing complexity Exam preparation180h = 56h attendance time + 124h independent work 180h
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	The course is suitable for students of computer science and engineering courses with a good knowledge of computer science from the first semester of a master's degree. The following are required: Basic knowledge of microcomputers Basic knowledge of information technology Object-oriented programming Communication systems, (networks)
Intended learning outcomes:	The course is divided into the following parts: Teaching the basics of distributed applications Structure and behavior of middleware concepts Application of object-oriented methods to middleware Presentation of the object-oriented middleware concept DOME (Distributed Object Model Environment)
Contents:	This lecture focuses on the use of middleware for distributed industrial applications. Techniques and design goals are described that middleware requires for distributed access to resources. Object-oriented software concepts are also included. Requirements on the coupling behavior of the components, on reflexive interfaces and software metrics are explained, which are mirrored on different

	middleware. The comparison is followed by the design and implementation of the event-driven middleware DOME (Distributed Object Model Environment), which has essential properties for real-time-capable industrial use. Questions of distributed system start-up, performance, authentication and authorization round off the course.
Type of examination:	Participation in the courses, successfully completed internships Exam at the end of the module
Media:	
Literature:	Dumke, R.: Distributed Systems, http://ivs.cs.uni-magdeburg.de/sw-eng/agruppe/lehre/vts.shtml Microsoft Corporation: DCOM - Architecture Overview - Technical Whitepaper, http://microsoft.com/com/doc, 1997 Schmidt, D.; Stal, M.; Rohnert, H.; Buschmann, F.: Pattern-Oriented Software Architecture - Patterns for Concurrent and Networked Objects, Volume 2, Wiley & Sons, 2000 Selic, B., Gullekson, G., Ward, P. T.: Real-Time Object-Oriented Modeling, John Wiley & Sons, 1994 Selic, B., Rumbaugh, J.: Using UML for Modeling Complex Real-Time Systems, Rational Software, 1998 van der Wal, Eelco: Structuring Program Development with IEC 61131-3, Internet: www.plcopen.org/intro_iec/structuring_program_development.htm Tanenbaum, A.; van Steen, M.: Distributed Systems - Fundamentals and Paradigms, Pearson Studium, 2003 Veríssimo, P.; Rodrigues, L.: Distributed Systems for System Architects, Kluwer Academic Publishers, 2001 Weber, M.: Distributed Systems, Spektrum Akademischer Verlag GmbH, 1998

English courtesy translation.
The German version is legally binding

Module title:	Mikrobiologie
Engl. module name:	Mikrobiologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. U. Reichl / Dr. H. Grammel / Dr. K. Bettenbrock
Lecturer(s):	Prof. Dr.-Ing. U. Reichl / Dr. H. Grammel / Dr. K. Bettenbrock
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 2 SWS lecture / 2 SWS practical course Independent work: Reviewing the lecture Preparation and follow-up of the internshipLecture: 3 CP = 90 h (28 h attendance time + 62 h independent work) Internship: 2 CP = 60 h (28 h attendance time + 32 h independent work)
Credit points / ECTS:	Lecture: 3 Internship: 2
Mandatory prerequisites :	Passing the microbiology exam is a prerequisite for participation in the practical course
Recommended prerequisites:	
Intended learning outcomes:	Students acquire basic skills in the fundamentals of microbiology. The topics cover the structure and function of microorganisms, various metabolic processes in microorganisms and the basics of microbial genetics. They are trained to pay attention to the interdisciplinary connections to the fields of biology and biochemistry and thus to understand the subject area in an integrative manner. The internship serves to acquire skills in the use of microbiological working techniques.
Contents:	Introduction to microorganisms Classification of microorganisms Structure and function of the prokaryotic cell Growth, reproduction and spore formation Basic mechanisms of metabolism Bioenergetics Basics of genetics
Type of examination:	Lecture: Written exam 90 min. Internship certificate
Media:	

Literature:	Will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Mikroskopie und Werkstoffcharakterisierung
Engl. module name:	Microscopy and Characterization of Materials
Module level, (optional):	
Abbreviation:	MuWC
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Materials and Joining Technology
Lecturer(s):	Professorship for Materials and Joining Technology
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Materials Science
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 3 SWS Lecture 1 SWS Internship Independent work: Follow-up of the lecture Preparing for the internship Preparation of test protocols 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Microstructure of the materials
Intended learning outcomes:	Learning objectives & skills to be acquired: The microscopic examination of the microstructure and the testing of material properties are prerequisites for material development, quality assurance and the control of technological processes. The basics and practical implementation of material microscopy with light and electron beams are covered, as well as an introduction to the quantification of microscope images with digital image analysis. In material characterization, the focus is on methods for testing mechanical (strength, toughness, hardness) and electrical micro and macro properties. The course content enables students to select problem-oriented test methods, evaluation techniques and sample preparation for a specific material problem, as well as to interpret the results and establish correlations between microstructure and properties.
Contents:	Light microscopy Electron microscopy Testing mechanical properties Testing electrical properties Corrosion investigation Wear behavior
Type of examination:	Achievements: Successful participation in the internship Exam: oral M30

English courtesy translation.
The German version is legally binding

Media:	
Literature:	H. Blumenauer: Werkstoffprüfung, Deutscher Verlag für Grundstoffindustrie, Leipzig/Stuttgart, 1994W. Schatt, H. Worch, Materials Science, Deutscher Verlag für Grundstoffindustrie, 8th edition, 1996 H.J. Bargel, G. Schulze, Materials Science, Springer Verlag 2005

English courtesy translation.
The German version is legally binding

Module title:	Mikrostruktur der Werkstoffe
Engl. module name:	Mikrostruktur der Werkstoffe
Module level, (optional):	
Abbreviation:	MikWst
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Materials Engineering
Lecturer(s):	Professorship for Materials Engineering
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Materials Science
Teaching method / weekly hours:	Lecture; practical course
Workload:	Attendance times: 3 SWS Lecture 1 SWS Internship Independent work: Follow-up of the lecture Preparing for the internship Preparation of the test protocols 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: The performance properties of materials are determined by their structure. This depends on the chemical composition, the crystal structure and the microstructure of the material. (microstructure). The evaluation of the material condition using microscope images and the interpretation of the properties requires basic knowledge of the material structure. Relationships between the structure and the properties as well as the influences on the microstructure during the solidification of molten metals are taught. The dependence of the properties, in particular strength, toughness and hardness, on the microstructure and their optimization through heat treatment by annealing or hardening is dealt with using technical alloys. The use of materials is explained on the basis of specific application requirements using examples from automotive and electrical engineering as well as apparatus engineering. Students learn to understand the relationships between the structure of materials and the resulting properties. They will be able to interpret the microstructure of materials depending on the heat treatment and assess their strength and fracture behavior. In addition, they will be able to select and use materials for specific purposes.

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The German version is legally binding

Contents:	Composition of materials Ideal and real crystal structureAlloy theoryMicrostructure formation during solidification of meltsDeformation and fractureProperty optimization through heat treatment (annealing, hardening)Use of materials
Type of examination:	Achievements: successful participation in the internship Exam: oral M30
Media:	
Literature:	W. Schatt, H. Worch, Materials Science, Deutscher Verlag für Grundstoffindustrie, 8th edition, 1996 H.J. Bargel, G. Schulze, Materials Science, Springer Verlag 2005

English courtesy translation.
The German version is legally binding

Module title:	Mobilkommunikation
Engl. module name:	Mobile Communication
Module level, (optional):	
Abbreviation:	MobCom
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Computer Engineering
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 h - 2 SWS Lecture - 2 SWS Exercise Independent work = 124 h - Processing of exercises and programming tasks & exam preparation
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Computer Networks Networkprogramming for IoT Seminar: Hot Topics in Communication Systems
Intended learning outcomes:	Learning objectives & acquired skills: - Students are able to understand the differences between classic fixed networks and mobile wireless networks and their effects on all protocol layers. - Comprehensive overview of the requirements and principles of mobile communication - Ability to analyze and classify the basic design alternatives and their inherent trade-offs

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The German version is legally binding

Contents:	- Technical basics - Media access procedure - Media access protocols (wired/wireless) - Wireless LANs (technologies, standards, areas of application) - Security issues - Network protocols (mobile IP, ad-hoc networks, wireless sensor networks, routing) - Transport protocols (TCP variants and mobile TCP)
Type of examination:	Successful completion of the exercises and programming tasks Exam: oral
Media:	
Literature:	Jochen Schiller, Mobile Communication, Addison-Wesley, 2nd edition, 2003

English courtesy translation.
The German version is legally binding

Module title:	Modeling with population balances
Engl. module name:	Modeling with population balances
Module level, (optional):	
Abbreviation:	PBM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professor for Thermal Process Engineering
Lecturer(s):	Jun.-Prof. Dr.-Ing. M. Peglow
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Presence: Weekly lecture 1 SWS Weekly exercises 2 SWS (with computer hands-on) Autonomous work: Complementary readingfinal project work 90h (42 h presence + 48 h autonomous work)
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The participants will learn to: characterize systems with coupled properties involving density functions model processes like nucleation, growth and agglomeration solve population balances (analytical solutions, momentum approaches, sectional models) apply population balances to real problems, in particular for process engineering
Contents:	Concept of population balances, properties of disperse systems Interaction between particles and continuous phase Relevant properties (internal coordinates) Temporal solution Heat, mass and momentum transfer between the disperse and the continuous phases Interactions between individual particles of the disperse phase Detailed consideration of key processes: nucleation, growth, breakage, agglomeration
Type of examination:	Exam: oral
Media:	
Literature:	Ramkrishna, "Population balances: theory and applications to par-ticulate systems in engineering", Academic Press (2000)

	Further literature given during first lecture

English courtesy translation.
The German version is legally binding

Module title:	Modellierung
Engl. module name:	Modeling
Module level, (optional):	
Abbreviation:	Mod
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	
Module coordinator:	Professorship of Applied Computer Science / Business Informatics I
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics I
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - Design WPF KWL B, WI 1.2 WI 2.1 WI 2.2
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 28h Lecture14 h Exercise Independent work: 42h Preparation and follow-up lecture 36h Development of models for the exercise 120h: Lecture 2 SWS = 28h attendance time + 42h independent work Exercise 1 SWS = 14h attendance time + 36h independent work
Credit points / ECTS:	4 CP 5 CP (SPO from 10/2023)
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Creation of the methodological basis for the implementation of real-world problems in complex software systems Creating a basic understanding of modeling Learning techniques for process and data modeling on a functional conceptual level Gain practical experience in model-driven system development
Contents:	Modelling theory: From the world of discourse to formalized information models Processes, workflows and business processes Meta-models, reference modeling Principles of proper modeling

English courtesy translation.
The German version is legally binding

	Business conceptual modeling with higher Petri nets, the entity relationship method and BPMN Object-oriented modeling with UML Implementation of specific tasks
Type of examination:	Written exam, 120 min. Appearance Preliminary work as specified at the beginning of the semester
Media:	
Literature:	Kecher, C. (2011): UML 2 - The comprehensive handbook. 4th ed. Reisig, W. (1998): System design with networks. Berlin et al.

English courtesy translation.
The German version is legally binding

Module title:	Modellierung und Expertensysteme in der elektrischen Energieversorgung
Engl. module name:	Modellierung und Expertensysteme in der elektrischen Energieversorgung
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. habil. Zbigniew Antoni Styczynski (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, bi-weekly exercises 1 SWS Independent work: Reworking the lecture, solving exercises, exam preparation 3 SWS = 150h (42h attendance time +108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives and acquired knowledge Acquisition of knowledge about modeling and simulation to analyze the conditions in electrical energy networks Designing models and carrying out calculations and simulations on the basis of models Acquisition of knowledge for the development, design and application of expert systems Application of expert systems for problems in energy supply
Contents:	Modeling - switching devices, design, functional capabilities and models - switching processes and representation of traveling wave processes in the network Expert systems - basic concepts, expert systems in energy supply, knowledge acquisition and knowledge representation - handling of inaccuracies, probabilities, fuzzy techniques and neural networks in expert systems, data and knowledge bases in expert systems, monitoring of electrical installations supported by knowledge-based systems, examples
Type of examination:	Oral examination
Media:	
Literature:	

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English courtesy translation.
The German version is legally binding

Module title:	Modellierung und Simulation von Computernetzen
Engl. module name:	Modellierung und Simulation von Computernetzen
Module level, (optional):	
Abbreviation:	SimComNets
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Computer Engineering / Communication and Networked Systems
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance time = 56 h 2 SWS Lecture 2 SWS Exercise Bachelor: Independent work = 94 h Processing of exercises and programming tasks & exam preparation Master: Independent work = 124 h Processing of exercises and programming tasks to an extended extent & exam preparation
Credit points / ECTS:	Bachelor: 5 Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Computer networksAlgorithms and data structures
Intended learning outcomes:	Learning objectives & acquired skills: Basic understanding of modeling computer systems and computer networks

English courtesy translation.
The German version is legally binding

	Understanding of the design, structure and creation of simulation systems Competence to carry out and evaluate simulations scientifically Competence in designing large series of experiments Competence in the use of an event-oriented network simulator
Contents:	Contents Introduction to simulation General principles of discrete-event simulations Introduction to network simulators Statistical models in simulations Random-number and random-variate generation Queuing models Input modeling Verification and validation of simulation models Output analysis Design of experiments For Master's students: advanced skills in scientific research and writing
Type of examination:	Services: Regular participation in lectures and exercises Successful completion of a programming task Exam: Written exam 120 min
Media:	
Literature:	A detailed bibliography will be provided in the lecture. Basic literature: Jerry Banks, John Carson, Barry L. Nelson, David Nicol: Discrete-Event System Simulation, Fifth Edition, 2010, Prentice Hall Averill M. Law: Simulation Modeling and Analysis, 2007, McGrawHill Klaus Wehrle, Mesut Güneş, James Gross: Modeling and Tools for Network Simulation, 2010, Springer

English courtesy translation.
The German version is legally binding

Module title:	Molekulare Immunologie
Engl. module name:	Molekulare Immunologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	FME, Prof. Dr. B. Schraven
Lecturer(s):	FME, Prof. Dr. B. Schraven
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS Lecture Independent work: Follow-up of the lecture120 h (28h attendance time + 92h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Building on the mastery of the basic principles of cell biology and immunology from the second and fourth semesters, acquisition of specialist knowledge in this field. Strengthening the motivation to work scientifically
Contents:	Molecular Immunology Immune response Signal transduction of the immune response Immune regulation Immunodeficiencies Tumor immunology Autoimmune diseases
Type of examination:	Written exam 2 hrs.
Media:	
Literature:	Will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Molekulare Zellbiologie
Engl. module name:	Molekulare Zellbiologie
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	FME, Prof. Dr. M. Naumann
Lecturer(s):	FME, Prof. Dr. M. Naumann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application subject - Biology
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS Lecture Independent work: Reviewing the lecture 90 h (28 h attendance time + 62 h independent work)
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Building on the knowledge gained in the "Cell Biology" module, students acquire the Ability to transfer the most important processes and principles to the molecular level.
Contents:	Introduction to cell biology Cell organization and organelles Membranes and membrane organization Cell transport Cell communication
Type of examination:	Written exam 2 hrs.
Media:	
Literature:	Will be announced in the lecture

English courtesy translation.
The German version is legally binding

Module title:	Multimedia and Security
Engl. module name:	Multimedia and Security
Module level, (optional):	
Abbreviation:	MMSEC
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of Applied Computer Science / Multimedia and Security
Lecturer(s):	Professorship of Applied Computer Science / Multimedia and Security
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture: 2 SWS weekly exercise incl. presentation topic: 2 SWS Independent work: Review of the lecture and preparation of the presentation 180h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Lecture "Secure Systems" or similar course, a lecture on the basics of pattern recognition
Intended learning outcomes:	Learning objectives & acquired skills: The student should be able to recognize and solve security problems in multimedia applications. To this end, he/she should acquire the skills to apply multimedia-specific implementations of security protocols for images, video and audio as well as complexes.
Contents:	Motivation, introduction and basics, as well as selected topics on: Intellectual Property Rights (IPR), Digital Rights Management (DRM) Access Protection: Pay-TV, Scrambling and Encryption of Video- and Audio Data, User Authentication and Accounting Covert communication: Hidden communication, steganography Authenticity and Integrity of digital Media: Basic techniques such as electronic signatures, digital watermarking, perceptual hashing, digital forensics

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Type of examination:	Examination performance / form: Presentation The presentation comprises an independent and in-depth written examination of a problem from the context of the course, including and evaluating relevant literature, as well as the presentation of the work and the communication of its results in an oral presentation and in the subsequent discussion. The papers must be submitted in writing
Media:	
Literature:	see wwwiti.cs.uni-magdeburg.de/iti_amsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Multimedia Retrieval
Engl. module name:	Multimedia Retrieval
Module level, (optional):	
Abbreviation:	MIR
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of databases
Intended learning outcomes:	Learning objectives & acquired skills: Basic understanding of searching in collections of multimedia data Knowledge of information retrieval concepts Knowledge of similarity calculation between media objects Knowledge of algorithms and data structures for efficient similarity calculation Knowledge of the creation and use of descriptive features from multimedia objects (text, image, sound, video) Ability to select and assess alternative concepts for similarity searches for specific (interactive) search scenarios
Contents:	Introduction and terms Principles of information retrieval Feature extraction and transformation process

	Distance functions Algorithms and data structures for efficient searches Inquiry languages User interfaces for multimedia retrieval systems
Type of examination:	Services: Regular participation in the lectures Solving the exercises and successful presentation in the exercises Exam: oral (also for certificate)
Media:	Power Point, blackboard
Literature:	Similarity Search in Multimedia Databases (Ingo Schmitt), Oldenbourg Wissenschaftsverlag GmbH, Munich, 2005. Modern Information Retrieval (Ricardo Baeza-Yates and Berthier Ribiero-Neto), Addison Wesley, 1999. Foundations of Statistical Natural Language Processing (Chris Manning and Hinrich Schütze), MIT Press, Cambridge, MA, 1999. Information Retrieval: Data Structures and Algorithms (William B. Frakes and Ricardo Baeza-Yates), Prentice-Hall, 1992. Soft Computing in Information Retrieval (Fabio Crestani and Gabriella Pasi), Physica Verlag, 2000.

English courtesy translation.
The German version is legally binding

Module title:	Music Information Retrieval
Engl. module name:	Music Information Retrieval
Module level, (optional):	
Abbreviation:	MIR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Sebastian Stober
Lecturer(s):	Prof. Dr. Sebastian Stober
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56 hours: 2 SWS Lecture 2 SWS Exercise Independent work = 94 hours: Preparation and follow-up of lectures and exercises, Working on exercises and programming tasks, course project
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	-
Contents:	- Music Representations- Fourier Analysis of Signals- Music Synchronization- Music Structure Analysis- Chord Recognition- Tempo and Beat Tracking- Content-Based Audio Retrieval- Musically Informed Audio Decomposition
Type of examination:	Examination in oral form: Announcement of the necessary preliminary work in the first week of the course and on the lecture website; Schein (oral): Announcement of the necessary preliminary work in the first week of the course and on the lecture website
Media:	

Literature:	Meinard Müller Fundamentals of Music Processing - Audio, Analysis, Algorithms, Applications, Springer 2015 ISBN: 978-3-319-21944-8

English courtesy translation.
The German version is legally binding

Module title:	Nachhaltigkeit
Engl. module name:	Sustainability
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester
Term:	Summer semester
Module coordinator:	Prof. Dr. rer. nat. F. Scheffler, FVST
Lecturer(s):	Dr. Hannah Wallis
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching method / weekly hours:	Lecture series (2 SWS) and scientific project work with presentation (1 SWS)
Workload:	5 CP = 150 hours (28h attendance time, 122h independent work)
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Students gain a broad insight into the importance of the sustainability of energy systems and the various facets of sustainability. They also recognize the connections between technical energy systems and their effects on the ecology and the social environment as well as the economic and approval-related boundary conditions.The knowledge acquired in the lecture enables students to develop and communicate technology in a more sustainable way.In addition, an energy technology is researched in detail in a team project work; the students learn to familiarize themselves independently with an area, to work on a current topic in a team and to present the findings.In addition, they gain insight into research and development of energy systems.
Contents:	- Lecture series on sustainability with the topics: environmental economics, climate change, environmental psychology, ecological consequences of land use change, approval procedures -Scientific project work in groups with presentation
Type of examination:	general:ungraded performance record For classification under:FIN: B.Sc. WIF - WPF Verstehen & Gestalten: Scientific project work (graded proof of achievement)
Media:	
Literature:	

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The German version is legally binding

Module title:	Narrative Visualization
Engl. module name:	Narrative Visualization
Module level, (optional):	
Abbreviation:	NarVis
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Visualization
Lecturer(s):	Prof. Dr.-Ing. Bernhard Preim / Dr. Monique Meuschke
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Attendance times: 2 SWS, weekly seminar, independent work: preparation of the talk, preparation of the seminar work
Credit points / ECTS:	3 credit points = 90 h (28 h attendance time + 62 h independent work), grading scale according to examination regulations
Mandatory prerequisites :	none
Recommended prerequisites:	Visualization
Intended learning outcomes:	Learning objectives and competences to be acquired: This seminar teaches how visualizations of various types of data can be designed such that they are appropriate for non-experts, e.g., for broad audiences. It is inspired by recent developments in data journalism where online media are employed to create an interactive experience. The core idea is to employ principles from storytelling and narration to the explanation of data. The seminar topics, cover narrative genres, such as animation, slide sets and data comics, narrative structures derived from storytelling, such as the Martini Glass structure and the

	Freytag's pyramid. The topics also cover a wide range of applications, including molecular visualization, visualization of astronomy and climate data as well as visualizations related to business and finance data. Accordingly, different visualization techniques are provided, e.g., time-line based visualization, various diagram types but also multi-scale 3D visualizations.
Contents:	Overview of Narrative VisualizationConcepts and Tools for Story GenerationApplications in climate research, molecular research and astronomyApplications in business and finance
Type of examination:	Examinations: student talk, seminar paper (10 pages)
Media:	PowerPoint presentation, use of whiteboard, videos
Literature:	Selected publications primarily from the following venues IEEE TVCG, ACM SIGCHI and CGF

English courtesy translation.
The German version is legally binding

Module title:	Neural-symbolic integration
Engl. module name:	Neural-symbolic integration
Module level, (optional):	
Abbreviation:	NeuroSymbV
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Till Mossakowski
Lecturer(s):	Prof. Till Mossakowski
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 14 X 4h (2h lecture + 2h exercise) = 56 h Independent follow-up of the lecture: 124 h
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	LogicDeep LearningMathematics I (Linear Algebra)
Intended learning outcomes:	Knowledge of the limitations of neural and of symbolic approachesKnowledge of different neural-symbolic architecturesAbility to choose and document an architecture for a given problemAbility to follow the recent literature on neural-symbolic integration
Contents:	Neural networks can learn flexibly from noisy data, but suffer from phenomena such as overfitting and catastrophic forgetting. Logical formalisms, on the other hand, can employ represent knowledge in a very general and abstract way, but suffer from a lack of reference of the symbols to real sensor data. Neural-symbolic integration tries to combine the strengths of both worlds in order to

	advance towards strong artificial intelligence. Current neural-symbolic integration systems can already outperform both deep learning and logical reasoning. The lecture will introduce into the field and present cutting-edge neural-symbolic integration frameworks such as logic tensor networks, neural logic machines and logical neural networks, as well as a systematic overview of neural-symbolic frameworks.
Type of examination:	Exercises and written exam The exact requirements for participation in the examination will be announced at the beginning of the course.
Media:	
Literature:	P. Hitzler and M. K. Sarker (eds.): Neuro-Symbolic Artificial Intelligence, IOS Press, 2022Michael van Bekkum, Maaike de Boer, Frank van Harmelen, André Meyer-Vitali, Annette ten Teije: Modular design patterns for hybrid learning and reasoning systems. Appl. Intell. 51(9): 6528-6546 (2021)Md. Kamruzzaman Sarker, Lu Zhou, Aaron Eberhart, Pascal Hitzler: Neuro-Symbolic Artificial Intelligence: Current Trends. CoRR abs/2105.05330 (2021)Artur d'Avila Garcez, Luís C. Lamb: Neurosymbolic AI: The 3rd Wave. CoRR abs/2012.05876 (2020)Tarek R. Besold, et al.: Neural-Symbolic Learning and Reasoning: A Survey and Interpretation. CoRR abs/1711.03902 (2017)Artur S. d'Avila Garcez, Krysia Broda, Dov M. Gabbay: Neural-symbolic learning systems - foundations and applications. Perspectives in neural computing, Springer 2002

English courtesy translation.
The German version is legally binding

Module title:	Neuronale Netze
Engl. module name:	Neural Networks
Module level, (optional):	
Abbreviation:	NN
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	FIN: Chair of Practical Computer Science / Artificial Intelligence
Lecturer(s):	FIN: Prof. Dr.-Ing. Sebastian Stober
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 28 hours: 2 SWS Lecture Independent work = 122 hours: Preparation and follow-up of the lecture, working on exercises and programming tasks
Credit points / ECTS:	5 CP (Bachelor and Master)
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science, algorithms and data structures, modeling, mathematics I to III
Intended learning outcomes:	Application of data analysis methods with neural networks to solve classification, regression and other statistical problems Evaluation and application of neural learning methods for the analysis of complex systems Ability to develop neural networks
Contents:	Introduction to the basics of neural networks from a computer science perspective Treatment of learning paradigms and learning algorithms, network models

Type of examination:	Examination in written form, duration: 120 minutes, Announcement of the necessary preliminary work in the first week of the course and on the lecture website Schein (written), Announcement of the necessary preliminary work in the first week of the course and on the lecture website
Media:	
Literature:	Rudolf Kruse et al, Computational Intelligence, 2nd edition, Springer-Vieweg, 2015 Additional further reading will be announced on the course website.

English courtesy translation.
The German version is legally binding

Module title:	Nichtlineare Finite Elemente
Engl. module name:	Nonlinear Finite Elements
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Junior Prof. Dr. Juhre, FMB-IFME
Lecturer(s):	Junior Prof. Dr. Juhre, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, practical course 1 SWS independent work on a project
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of technical mechanics
Intended learning outcomes:	Lecture focus: Overview of geometrically and physically non-linear problems (an introductory example) Fundamentals of continuum mechanics (distortion and stress measures, weak form of equilibrium, linearizations, TL and UL formulations) Geometric non-linear finite elements Solution method for non-linear systems of equations Overview of material laws and their use in the FEM Contact problems Transient calculations Consolidation of the material using examples and calculations of tasks with the help of commercial FEM software
Contents:	Qualification goals and contents of the module: Without non-linear calculations, it is not possible, for example, to identify and use the load-bearing reserves of a structure (lightweight construction!) and to improve the reliability of structures (damage-tolerant designs, safety in the event of cracks, ageing, corrosion, etc.); the simulation and optimization of manufacturing processes (e.g. forming, forging, cutting, ablation) are not possible without non-linear calculations. In addition, non-linear calculations lead to a better understanding of structural behavior (e.g. stability phenomena). In the lecture, students are enabled to recognize the necessity of non-linear calculations, to create a suitable model to solve a problem, to solve the model problem using FEM and to critically evaluate the results obtained.

	In addition to the theoretical basics, practical problems are solved and discussed in the exercises. In the project work, each student solves an individual problem using commercial FEA software (Ansys, Apaqus).
Type of examination:	Exam: Oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Numerical Methods for Visual Computing
Engl. module name:	Numerical Methods for Visual Computing
Module level, (optional):	
Abbreviation:	NMVC
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Compulsory subjects FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	In class teaching: - 2 SWS lecture / 2 SWS tutorial Self-study: - Self-study of lecture material / solution of exercises and assignments
Credit points / ECTS:	6 credit points = 180h (56h in class + 124h self study), grading scheme according to exam regulations
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The course provides an introduction to common numerical methods for visual computing, such as numerical linear algebra, time integration schemes for ordinary differential equations, numerical solution of partial differential equations, basis representations for functions, and tensor analysis. It also covers the requisite mathematics.
Contents:	Numerical linear algebra (e.g. (iterative) solution of linear systems, eigen and singular value decomposition)Basis representations ((Fast) Fourier transform, finite elements, polynomial bases; interpolation and quadrature)Numerical solution of ODEsNumerical solution of PDEsVector calculus and tensor analysis

English courtesy translation.
The German version is legally binding

Type of examination:	Oral exam
Media:	Board, slides
Literature:	G. Strang. Linear Algebra and Its Applications. Thomson, Brooks/Cole, 2006.L. N. Trefethen. Approximation Theory and Approximation Practice. Society for Industrial and Applied Mathematics, 2012.V. I. Arnold. Ordinary Differential Equations. Springer-Textbook. Springer, third ed. edition, 1992.J. Kirkwood. Mathematical physics with partial differential equations. 2018.(Additional relevant literature will be announced in class)

English courtesy translation.
The German version is legally binding

Module title:	Optimal Control
Engl. module name:	Optimal Control
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT)
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen (FEIT-IFAT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving exercises and exam preparation, project work 3 SWS = 150h (42h attendance time +108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Control engineering
Intended learning outcomes:	Learning objectives and acquired skills: The module provides an introduction to the formulation, theory, solution and application of optimal control theory/dynamic optimization. The students are enabled to formulate and solve optimal control problems appearing in many applications spanning from medicine, process control up to systems biology. Besides the theoretical basis numerical solution approaches for optimal control problems are provided.
Contents:	Static optimization Numerical algorithms Dynamic programming, principle of optimality, Hamilton-Jacobi-Bellmann equation Variational calculus Pontryagin maximum principle Numerical solution of optimal control problems Infinite and finite horizon optimal control, LQ optimal control Model predictive control Game theory Application examples from various fields such as chemical engineering, economics, aeronautics, robotics, biomedicine and systems biology
Type of examination:	Written exam 120 min
Media:	
Literature:	

Module title:	Parallel Programming - M
Engl. module name:	Parallel Programming - M
Module level, (optional):	
Abbreviation:	PP-M
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	English
Assignment to the curriculum:	Computational Methods in Engineering - compulsory
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance: 2 SWS lecture + 2 SWS exercise (56h)Self-study: Working on the exercises, reviewing the lecture, preparing for the exam (94h)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Required skills: Practical knowledge of a programming language and the ability to create simple applications Recommended skills: Basic knowledge about operating systemsBasic knowledge about parallel programming
Intended learning outcomes:	Participants will learn how to create parallel programs using various programming approaches, how to execute them and how to optimize their execution. In addition, further concepts for parallelization are taught and put into practice in the exercises.
Contents:	Parallel programming is becoming increasingly important, as even phones and laptops have several processor cores. Some supercomputers even consist of several million cores and have established themselves as a useful and indispensable tool for many areas of science. The resulting analyses and simulations have made it possible to significantly increase scientific insight in many areas. However, the optimal use of these components is no easy task, which is why scientists are constantly faced with new challenges when developing efficient applications. A deeper understanding of the hardware and software environment as well as the

	possible causes of errors is therefore essential for parallel programming. In the lecture, the basics of parallel programming are taught; the exercises serve the practical application and implementation of the acquired knowledge in the C programming language. The lecture will cover some of the most important topics: Hardware and software concepts (multi-core processors, processes/threads, NUMA etc.), different approaches to parallel programming (OpenMP, POSIX threads, MPI) as well as tools for performance analysis and debugging (scalability, deadlocks, race conditions etc.). Furthermore, reasons and solutions for performance problems are discussed and alternative approaches to parallel programming are presented. Examples and problems are illustrated using real scientific applications.
Type of examination:	Active and successful participation in the exercisesWritten exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Parallel Storage Systems
Engl. module name:	Parallel Storage Systems
Module level, (optional):	
Abbreviation:	PSS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Presence: 2 hours of lecture + 2 hours of exercises (56h) Self-study: Solving exercises, independent studies, preparation for final examination (124h)
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Practical knowledge of a programming language and the ability to create simple applications Basic knowledge about operating systems Basic knowledge about parallel programming
Intended learning outcomes:	Participants will learn how parallel applications perform I/O using different programming concepts and how I/O can be optimized. Additionally, they will gain insight into and practical experience with the internals of storage and file systems.
Contents:	Parallel programming is becoming increasingly important since even phones and laptops contain multiple processor cores nowadays. Supercomputers can contain up to several million cores and have become a useful and important tool for a wide range of scientific domains. The analyses and simulations enabled by them have accelerated the process of gaining scientific insight considerably. The amount of collected and produced data is growing exponentially; it has to be stored, analyzed and processed efficiently since I/O significantly affects overall performance.

	Vastly different rates of performance development for processors and storage hardware result in a performance imbalance, which makes it even more important to take a close look at storage systems in order to be able to meet future demands. The lecture will teach the fundamentals of parallel storage systems and I/O; the exercises will allow transferring and applying the acquired skills with a system programming language such as C, C++ or Rust. As part of the lecture, we will cover the complete storage stack: Storage devices and networks (hard disk drives, solid-state disks, storage area networks etc.), local and distributed file systems (in kernel and user space, novel concepts like snapshots and deduplication) as well as the I/O interfaces layered on top (POSIX, MPI-IO, NetCDF and ADIOS). Furthermore, we will discuss reasons and solutions for performance problems as well as alternative approaches for I/O (such as cloud interfaces). Problems and examples will be motivated using real-world scientific applications.
Type of examination:	Active participation in the exercisesOral examination
Media:	
Literature:	High Performance Parallel I/O (Prabhat and Quincey Koziol)

English courtesy translation.
The German version is legally binding

Module title:	Parallele Programmierungen
Engl. module name:	Parallel Programming
Module level, (optional):	
Abbreviation:	PP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc from 3rd Semester
Term:	Winter term
Module coordinator:	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance: 2 SWS lecture + 2 SWS exercise (56h) Independent work: Working on the exercises, reviewing the lecture, preparing for the exam (94h)
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Practical knowledge of a programming language and the ability to create simple programs Knowledge of the basic mechanisms of operating systems (e.g. computer engineering) Basic knowledge of computer architectures
Intended learning outcomes:	Participants will learn how to create parallel programs using various programming approaches, how to execute them and how to optimize their execution. In addition, further concepts for parallelization are taught and put into practice in the exercises.
Contents:	Parallel programming is becoming increasingly important, as even cell phones and laptops today have several processor cores. Some supercomputers even have several million cores and have established themselves as a useful and now indispensable tool for many areas of science. The resulting analyses and simulations have made it possible to significantly increase scientific knowledge in many areas. However, the optimal use of these components is no easy task, which is why scientists are constantly faced with new challenges in the development of efficient applications. A deeper

	understanding of the hardware and software environment and possible causes of errors is therefore essential for parallel programming. The fundamentals of parallel programming are taught in the lecture; the exercises are used for the practical application and implementation of the acquired knowledge in the C programming language. The lecture covers some of the most important topics: Hardware and software concepts (multi-core processors, processes/threads, NUMA etc.), different approaches to parallel programming (OpenMP, POSIX threads, MPI) as well as tools for performance analysis and debugging (scalability, deadlocks, race conditions etc.). In addition, reasons and solutions for performance problems are discussed and alternative approaches to parallel programming are presented. Examples and problems are illustrated using real scientific applications.
Type of examination:	Active and successful participation in the exercises Written examination
Media:	
Literature:	High Performance Computing: Modern Systems and Practices (Thomas Sterling, Matthew Anderson und Maciej Brodowicz)

English courtesy translation.
The German version is legally binding

Module title:	Praktikum
Engl. module name:	Internship
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 7th semester
Term:	every semester
Module coordinator:	Dean of Studies at FIN
Lecturer(s):	All FIN lecturers
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV FIN: B.Sc. INF FIN: B.Sc. INGINF FIN: B.Sc. WIF
Teaching method / weekly hours:	Internship
Workload:	20 weeks Internship specific
Credit points / ECTS:	18
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	After successfully completing the internship, students will have gained insights into the operational processes and organization in industry and public institutions, as well as into the social structures of companies/organizations. They know typical tasks in research and development and/or in production and operation. Students can work on and successfully solve a technical problem in an operational environment under supervision. You have knowledge of practical methods of algorithm, software and user interface development and/or the use of modern technologies in information and communication technology. Communication technology.
Contents:	Internship-specific in relation to the degree program
Type of examination:	Internship report
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Praktikum IT Sicherheit
Engl. module name:	Praktikum IT Sicherheit
Module level, (optional):	
Abbreviation:	P-ITSEC
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of Applied Computer Science / Multimedia and Security
Lecturer(s):	Professorship of Applied Computer Science / Multimedia and Security
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Internship
Workload:	Attendance times: 28 h Project meeting, submission and acceptance Independent work: 132 h Development of a software solution 20 h Preparation and implementation of a presentation and submission of the results of the software internship (28 h attendance time + 152 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: The student should acquire additional practical skills in IT security in the focus area of security and cryptology as part of an internship (software development project). He/she should independently work on and solve a current and challenging topic within an associated task and present it orally and document it in writing.
Contents:	Internship as a software development project: Working on a selected current topic and solving a challenging development task in the field of IT security, such as from: System, network and application security Cryptology and protocols Media security and biometric systems Specification and formal verification of secure systems IT security management

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The German version is legally binding

Type of examination:	Scientific project, includes presentation, submission and acceptance of the software development project
Media:	
Literature:	see wwwiti.cs.uni-magdeburg.de/iti_amsl/lehre/

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The German version is legally binding

Module title:	Principles and Practices of Scientific Work and Soft Skills
Engl. module name:	Principles and Practices of Scientific Work and Soft Skills
Module level, (optional):	
Abbreviation:	PPSW
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Coordinator International Relations and Exchange
Lecturer(s):	Dr. Claudia Krull
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	90 hours (40 h attendance time + 50 h independent work)
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Students have understood and practiced the skills necessary for scientific work and writing scientific publications, such as a Master's thesis. Students have learned soft skills and corresponding techniques, helpful for mastering their studies and also their professional and private life, such as setting goals, time management and working in teams.
Contents:	The course covers the following topics, among others: Introduction to Scientific Work Literature Research and Management Research Projects and Thesis Topics Scientific Writing - Thesis Structure and Writing Techniques Study Skills & Self Management Project Management & Team Work Presentation Skills The project and term paper topic can be related to an ongoing research project or be used for Master's thesis preparation.
Type of examination:	Examination performance Term paper
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Process control
Engl. module name:	Process control
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr.-Ing. habil. Achim Kienle (FEIT-IFAT)
Lecturer(s):	Prof. Dr.-Ing. habil. Achim Kienle (FEIT-IFAT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, weekly exercises 1 SWS, Independent work: Follow-up of the lecture, solving the exercises and exam preparation 3 SWS = 150h (42h attendance time +108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge in control theory
Intended learning outcomes:	Students should Learn fundamentals of multivariable process control with special emphasis on decentralized control Gain the ability to apply the above mentioned methods for the control of single and multi unit processes Gain the ability to apply advanced software (MATLAB) for computer aided control system design
Contents:	Introduction Process control fundamentalsMathematical models of processes Control structuresDecentralized control and Relative gain analysis Tuning of decentralized controllersControl implementation issues Case studies Plantwide control
Type of examination:	Oral examination, presentation
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Produktdatenmodellierung
Engl. module name:	Produktdatenmodellierung
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr. Christian Diedrich, FEIT-IFAT
Lecturer(s):	Prof. Dr. Christian Diedrich, FEIT-IFAT
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Wöcht. Lectures 2 SWS/ weekly exercises 1 SWS Independent work: Reviewing the lecture; solving the exercises and preparing for the exam 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	Basic knowledge of computer science and software development
Recommended prerequisites:	
Intended learning outcomes:	Classification of components of technical systems with regard to their model characteristics Teaching the meth. Basics for product data description, including: Feature systems, semantic networks and notation forms such as XML and class diagrams Presentation of key standards in the field, e.g. IEC 61360, ecl@ss, ETIM, BMEcat, PROLIST Presentation of a feature-based information model Mechanical, electrical and automation application examples
Contents:	In many areas of mechanical and plant engineering and automation technology, the efficient flow of information between different life cycle phases, tools and the engineers involved is becoming increasingly important. The trend is to gradually replace routine engineering work with automated or partially automated technical processes. This requires clear, digitally available descriptions of the components of the technical systems. The descriptions are referred to as product data, which are brought together in mechatronic models. This course teaches the basics of digital modeling of technical systems

Type of examination:	Participation in the courses; examination at the end of the module, points awarded after written exam or oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Programmierparadigmen
Engl. module name:	Programming Paradigms
Module level, (optional):	
Abbreviation:	PGP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Dr.-Ing. Christian Braune
Lecturer(s):	Dr.-Ing. Christian Braune
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science
Intended learning outcomes:	Knowledge of the main programming paradigms Applying the techniques of these paradigms Decision-making skills for the application of suitable programming paradigms in practice
Contents:	Concepts of the main paradigms procedural,object-oriented,functional,logical,and possibly other paradigmsTechnical implementation of the paradigms in programming languagesApplication of the paradigms in programming languages such as CJavaScalaHaskellPrologDecision criteria for paradigms
Type of examination:	Examination prerequisite required Exam: oral exam (if there are a sufficient number of participants: written exam, 120 minutes)
Media:	
Literature:	

Module title:	Prozessmanagement

English courtesy translation.
The German version is legally binding

Engl. module name:	Prozessmanagement
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: SWS lecture = 28h, 2 SWS exercise = 28h Independent work: Lecture preparation and follow-up Development of solutions in the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of methods and tools in the field of management information systems (e.g. through the course: Introduction to Management Information Systems)
Intended learning outcomes:	Learning objectives & skills to be acquired: Understanding how processes influence the aspects of customer orientation, productivity and value of an organization Application of a methodical approach to the analysis and optimization of processes Application of a methodical approach to measuring process performance Application of a methodical approach to the introduction of process management in organizations
Contents:	Basics of process management Procedure concept for the introduction of process management Methods for process identification and process implementation Process controlling Methods for process improvement and process renewal Customer Relationship Management Supply Chain Management

English courtesy translation.
The German version is legally binding

	Product Lifecycle Management
Type of examination:	Examination prerequisite: Successful completion of the semester assignment enables students to take part in the oral examination Examination: oral examination
Media:	
Literature:	Seehttp://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module title:	Qualitätsmanagementsysteme (FIN)
Engl. module name:	Qualitätsmanagementsysteme (FIN)
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture = 28h 2 SWS exercise = 28h Independent work: Lecture preparation and follow-up Development of solutions in the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of methods and tools in the field of management information systems (e.g. through the course: Introduction to Management Information Systems)
Intended learning outcomes:	Learning objectives & skills to be acquired: Understanding the conflicting priorities of quality, costs and time Application of a methodical approach to the introduction of quality management in organizationsUnderstanding the legal consequences of poor qualityApplication of methodical approaches to measuring the tension between quality, costs and time Application of process-oriented quality management
Contents:	Basics of quality management Procedure concept for the introduction of a quality management system Legal aspects of quality management Deming's management program Methods, tools and initiatives for quality management

Type of examination:	Examination prerequisite: Successful completion of the semester assignment enables students to take part in the oral examination Exam: oral exam
Media:	
Literature:	Seehttp://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module title:	Rechnerunterstützte Ingenieursysteme
Engl. module name:	computer supported engineering systems
Module level, (optional):	
Abbreviation:	RUIS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	
Module coordinator:	Dean of the FIN
Lecturer(s):	Dr.-Ing. Martin Endig
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Dealing with user systems, in-depth study of literature 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Develop an understanding of the use of state-of-the-art information technologies in the manufacturing industry, overview of concepts and methods of organizational structure and process organization in companies Getting to know computer-aided engineering systems, developing an understanding of the fields of action of the subsystems and their implementation Learning about concepts for research-integrated production, deriving experience from IT systems presented and used
Contents:	Concepts for describing the organizational and operational structure of manufacturing companies State of the art of computer-integrated production Discussion and evaluation of computer-aided engineering systems in individual production areas (CAX, PPS, PDM...) Integration approaches (CIM, PLM, EAI) Presentation of selected examples
Type of examination:	Exam prerequisite: registration and participation in lecture and exercises Examination/ certificate: written (120 min)
Media:	

Literature:	Own script + various special literature

English courtesy translation.
The German version is legally binding

Module title:	Recommenders
Engl. module name:	Recommenders
Module level, (optional):	
Abbreviation:	RECSYS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Business Information Systems Release / assignment to interdisciplinary degree programs and degree programs outside the FIN: see statutes of the respective degree program and, (optional), export agreement
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: - 2 SWS Lecture - 2 SWS Exercise Independent work: - Preparation and follow-up of the lecture - Development of solutions for exercises - Preparation for the final exam
Credit points / ECTS:	Bachelor's degree programs: 5 CP = 150h = 56h attendance time + 94h independent work Master's programs: 6CP = 180h = 56h attendance time + 94h independent work + 30h independent work for an additional task that is announced during the course.
Mandatory prerequisites :	
Recommended prerequisites:	- Databases -Programming paradigms or software engineering - Data Mining / Machine Learning / comparable module

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Intended learning outcomes:	- Understanding the operational requirements of a recommendation engine - Specialist knowledge of the methods that fulfill these requirements, primarily (but not only) machine learning methods - Confident handling of specialist literature
Contents:	- Recommendation engines in CRM - Components of recommendation engines - Learning methods for recommendation engines - Process for analyzing content & opinions
Type of examination:	Advance payments: Successful completion of the exercisesPresentation of results Modalities will be given at the beginning of the event. Exam: written
Media:	
Literature:	The literature recommendations (reference books and scientific articles) will be announced as part of the slide set. The bibliography may include additional case studies and other academic papers. These will be announced at the beginning of each course block.

English courtesy translation.
The German version is legally binding

Module title:	Regelungstechnik
Engl. module name:	Control systems
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Winter semester
Module coordinator:	Professorship of Systems Theory and Control Engineering
Lecturer(s):	Prof. Dr.-Ing. Rolf Findeisen
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 1 SWS exercise Independent work: Solving the exercises (preparatory before the exercise) 90h = 3 SWS = 42h attendance time + 48h independent work
Credit points / ECTS:	§
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics I-III, Signals and Systems
Intended learning outcomes:	Learning objectives and skills to be acquired: Acquisition of basic knowledge and a basic understanding of the tasks and concepts of control engineering Development of the ability to formally describe and analyze linear single-variable control systems in the time and frequency domain Development of the ability to synthesize linear single-variable control systems
Contents:	Introduction: Tasks and objectives of control engineering Mathematical modeling with the help of differential equations Behavior of linear time-invariant systems (stability, transmission behavior) Analysis in the frequency range Simple control methods and controller designs (PID, PI, loop-shaping)
Type of examination:	Exam: written (120 min)
Media:	
Literature:	[1] Lunze, J.: Regelungstechnik 1, Springer, 2004 [2] Föllinger, O.: Regelungstechnik, Hüthig, 1994 [3] Dorf, R. C.: Bishop, R. H.: Modern Control Systems, Prentice Hall, 2004

	[4] Horn, M.: Dourdoumas, N.: Regelungstechnik Pearson Studium, 2004

English courtesy translation.
The German version is legally binding

Module title:	Regelungstechnik I
Engl. module name:	Regelungstechnik I
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. A. Kienle, FEIT-IFAT
Lecturer(s):	Prof. A. Kienle, FEIT-IFAT
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: 2 SWS Lecture 1 SWS exercise Practical test á 3 hours independent work: Rework lecture/ experiment, Exercises, Exam preparation
Credit points / ECTS:	3
Mandatory prerequisites :	Mathematical basics Measurement technology lecture
Recommended prerequisites:	
Intended learning outcomes:	Basic tasks/concepts of control engineering Ability to formally describe and analyze linear single-variable control systems Ability to synthesize linear single-variable control systems Practical experience with control loops
Contents:	Introduction: Tasks and objectives of control engineering Mathematical modeling with the help of differential equations Behavior of linear time-invariant systems (stability, transmission behavior) Analysis in the frequency range Standard procedure Analysis and design of control loops Practical course: Experimental testing of PID control parameters
Type of examination:	Exercise certificate, participation in practical course, written exam 90 min
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Robust Geometric Computing
Engl. module name:	Robust Geometric Computing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Professorship for Theoretical Computer Science / Algorithmic Geometry
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Frontal exercises and practical exercises Independent work: Work on the exercises and follow up on the lectures 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of algorithmic geometry, programming language C++
Intended learning outcomes:	Learning objectives & acquired skills: Knowledge of the rounding error problem in geometric calculations. Ability to avoid rounding error problems, for example through verified numerical and exact geometric calculations. Software libraries CGAL, LEDA, GMP, CORE
Contents:	Fundamentals of floating point arithmetic, error estimation, interval arithmetic, exact integer and rational arithmetic, floating point filters, methods for exact arithmetic with algebraic numbers.
Type of examination:	Examination prerequisite: see lecture Exam: oral
Media:	
Literature:	Boissonnat (Ed.); Effective Computational Geometry

	Mehlhorn, Yap; Robust Geometric Computation (in preparation)

English courtesy translation.
The German version is legally binding

Module title:	Robuste Messgrößenreglung
Engl. module name:	Robuste Messgrößenreglung
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr.-Ing. Ulrich Jumar (FEIT-IFAT)
Lecturer(s):	Prof. Dr.-Ing. Ulrich Jumar (FEIT-IFAT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, bi-weekly exercises 1 SWS Independent work: Revising lectures, solving exercises, preparing for exams 3 SWS / 5 CP = 150h (42h attendance time + 108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Fundamentals of control engineering
Intended learning outcomes:	Learning objectives and skills to be acquired: Knowledge of the properties and description forms of multi-variable control systems is imparted. The acquired competence in practically relevant control structures is deepened using examples in the exercise. A sound understanding of coupling in multivariable systems is developed as the basis for the design methods covered. The mathematical description of model uncertainties forms the starting point for imparting knowledge of selected methods for analyzing and synthesizing robust multivariable control systems
Contents:	Characteristics and description of multivariable systems Stability analysis and coupling analysis Background and practicability of selected design methods Consideration of model uncertainties, standard estimates Analysis and synthesis of robust multivariable control with MATLAB
Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Schlüsselkompetenzen I&II
Engl. module name:	Key Competencies I&II
Module level, (optional):	
Abbreviation:	SchlüKo I / SchlüKo II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	every semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Claudia Krull
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. CV - Key and methodological skills FIN: B.Sc. INF - Core subjects FIN: B.Sc. INF - Key and methodological skills FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. INGINF - Key and methodological skills FIN: B.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture
Workload:	Attendance times = 56 h Winter semester: 2 SWS lecture Summer semester: 2 SWS lecture Independent work = 124 h Homework & exam preparation
Credit points / ECTS:	5 CP (for SPO from 10/2023) (6 CP with SPO until 09/2023)
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Structure of the degree program and study techniques Communication and collaboration Effective and efficient life planning act according to a work plan Successful studying Finding creative solutions Understand yourself and others better express yourself in speech and writing
Contents:	Study planning & successful studying Goals & goal-oriented action Time management & scheduling Think and act independently Values and ethical behavior Teams and team spirit Entrepreneurial spirit & initiative

English courtesy translation.
The German version is legally binding

	Leading the discussion scientific reports and presentations Digital Rights
Type of examination:	Graded: Written exam, 120 min
Media:	
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module title:	Schlüsselkompetenzen I&II (dual)
Engl. module name:	Key Competencies I&II
Module level, (optional):	
Abbreviation:	SchlüKo I / SchlüKo II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	every semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Claudia Krull
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Core subjects FIN: B.Sc. CV - Key and methodological skills FIN: B.Sc. INF - Core subjects FIN: B.Sc. INF - Key and methodological skills FIN: B.Sc. INGINF - Core subjects FIN: B.Sc. INGINF - Key and methodological skills FIN: B.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture
Workload:	Attendance times = 56 h Winter semester: 2 SWS lecture Summer semester: 2 SWS lecture Independent work = 124 h Homework & exam preparation
Credit points / ECTS:	5 CP (for SPO from 10/2023) (6 CP with SPO until 09/2023)
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Structure of the degree program and study techniques Communication and collaboration Effective and efficient life planning act according to a work plan Successful studying Finding creative solutions Understand yourself and others better express yourself in speech and writing
Contents:	Study planning & successful studying Goals & goal-oriented action Time management & scheduling

	Think and act independently Values and ethical behavior Teams and team spirit Entrepreneurial spirit & initiative Leading the discussion scientific reports and presentations Digital Rights
Type of examination:	Presentation in cooperation with the practice partner as preliminary work Graded: Written exam, 120 min
Media:	
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module title:	Schlüsselkompetenzen III
Engl. module name:	Key Competencies III
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; tutorials, teamwork
Workload:	180 hours (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: advanced knowledge of communication Cooperation Effective self-management Scientific work Important occupational factors
Contents:	Scientific work III + IV Personal productivity Life Leadership Problem solving techniques Added value and customer benefits Innovation Lateral thinking Career choice Leading meetings
Type of examination:	Examination performance Graded: Written exam, 120 min
Media:	Blog
Literature:	See www.sim.ovgu.de

English courtesy translation.
The German version is legally binding

Module title:	Scientific Computing II
Engl. module name:	Scientific Computing II
Module level, (optional):	
Abbreviation:	SC II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Computer Games FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	2 SWS lecture, 2 SWS exercise and self-study
Credit points / ECTS:	5 CP Grading following study and examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	Linear algebra, an introduction to scientific computing (floating point numbers, numerical solution of linear systems, eigen decomposition, DFT/FFT)

English courtesy translation.
The German version is legally binding

Intended learning outcomes:	The course provides an introduction to ordinary and partial differential equations and their discretization. It also considers questions such as consistency, stability and convergence with an emphasis on their practical relevance.
Contents:	Introduction into ODEsInitial value problems, well posed problemsConsistency, stability, convergenceExplicit and implicit time stepping methodsOne-step and multi-step time stepping methodsIntroduction to PDEsBasis representations and Galerkin projectionSpectral methods and finite elementsAdvection equation, Laplace equation, wave equations
Type of examination:	Passing the exam
Media:	
Literature:	- V. I. Arnold. Ordinary Differential Equations. Springer-Textbook. Springer, third ed. 1992. - A. Iserles, A First Course in the Numerical Analysis of Differential Equations, Cambridge University Press, 2009. - L. N. Trefethen, Exploring Ordinary Differential Equations, SIAM, 2017 - G. Strang, Computational Science and Engineering, Cambridge University Press, 2007.

English courtesy translation.
The German version is legally binding

Module title:	Scientific Machine Learning for Simulations
Engl. module name:	Scientific Machine Learning for Simulations
Module level, (optional):	
Abbreviation:	SMLfS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Prof. Dr. Christian Lessig, Prof. Dr. Thomas Richter (FMA)
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	3 credit points = 150 h (28h attendance time + 122h independent work), Grading scale according to examination regulations
Credit points / ECTS:	3 CP
Mandatory prerequisites :	none
Recommended prerequisites:	Recommended: Introductory course on neural networks, Scientific Computing I and II (or similar courses on numerics of ODEs and PDEs
Intended learning outcomes:	In the seminar we will discuss recent papers from the scientific machine learning literature on the use of neural networks (and related machine learning techniques) for the simulation of physical systems. We will also cover the analysis of neural networks in this context.
Contents:	Application of neural networks for the simulation of physical systems (and simulations in general)Mathematical analysis of neural networks, with a focus on simulations
Type of examination:	Presentation (potentially also results of implementation)
Media:	Board, slides, computer code
Literature:	Will be announced at the beginning of the term.

English courtesy translation.
The German version is legally binding

Module title:	Scientific Writing
Engl. module name:	Scientific Writing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Claudia Krull
Lecturer(s):	Temitope Ibidunni Akinloye
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Seminar
Workload:	2 SWS Seminar participation, independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge about scientific writing Capability to review scientific articles Usage of web-based submission and review systems
Contents:	Literature citation and paraphrasing Presentations Review scientific articles Argument formation Knowledge and application of academic writing styles Peer review assessment
Type of examination:	Seminar paper (Paper + Reviews) Presentation
Media:	
Literature:	

Module title:	Scrum-in-Practice

English courtesy translation.
The German version is legally binding

Engl. module name:	Scrum-in-Practice
Module level, (optional):	
Abbreviation:	SIP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IKS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 224h independent work on the internship project
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Software Engineering
Intended learning outcomes:	Knowledge of the Scrum project management method Practical application of agile software development methods Gain practical experience by carrying out a project and reflecting on self-management and project management
Contents:	This module teaches theoretical knowledge and practical skills in dealing with Scrum. The course consists of three parts. In an introductory part, the necessary concepts of the Scrum process model are presented in two lectures and the technologies required for successful project implementation are specified. In

	the main part of the course, a project is implemented using Scrum in a one-week block course. This takes place in project teams of 4-5 participants. During this phase, Scrum meetings are held twice a day with the supervisors. As a result, the participants learn to develop in a targeted and efficient manner according to this development model. The block course takes place in one week during the lecture-free period. Attendance is of course compulsory. In order to successfully complete the project work, each participant is expected to familiarize themselves thoroughly with the necessary technologies. At the end of the project week, the participants reflect on their experiences and summarize them. These results are then discussed in a joint closing event.
Type of examination:	Examination: scientific project
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Segmentation Methods for Medical Image Analysis
Engl. module name:	Segmentation Methods for Medical Image Analysis
Module level, (optional):	
Abbreviation:	SMMA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Prof. Dr. Klaus Tönnies
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Project
Workload:	Attendance times:weekly lectures: 2 SWS14-day project meetings: 2 SWS Independent work:Project preparation and implementation in small working groupsPreparation of a project presentationPreparation and follow-up of the lecture material180h (56h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of numerics and linear algebra, basic knowledge of image or signal processing, ability to implement moderately complex algorithms in any common programming language
Intended learning outcomes:	Learning objectives & skills to be acquired: Competence in the algorithmic solution of segmentation problems in medical images Ability to carry out a project to solve a segmentation problem Ability to present and defend own work results
Contents:	Segmentation as optimization problem Gradient descent methods Level set segmentation Graph-based segmentation Trained segmentation & deep learning
Type of examination:	Preliminary performance is required. Examination: oral
Media:	

Literature:	http://wwwisg.cs.uni-magdeburg.de/bv/

English courtesy translation.
The German version is legally binding

Module title:	Selected Chapters of IT Security 1
Engl. module name:	Selected Chapters of IT Security 1
Module level, (optional):	
Abbreviation:	ITSEC 1
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills Key and methodological skills - Scientific team project
Teaching method / weekly hours:	Seminar
Workload:	Seminar on selected technical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 2 SWS Attendance times and independent work see point "Credit points / ECTS" All degree programs except DKE;M: 3 credit points = 90h (28 h attendance time + 62 h independent work) DKE;M: 4 credit points = 120h (28 h attendance time + 92 h independent work)
Credit points / ECTS:	3 DKE: 4
Mandatory prerequisites :	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired skills: In a seminar focusing on security and cryptology, the student should learn and experience supplementary and up-to-date

	knowledge on selected technical topics using IT security as an example in order to be able to apply IT security strategies. In doing so, he/she should independently work on a limited, challenging topic theoretically and practically and document it in writing.
Contents:	Current IT security challenges and solutions for selected technical topics such as from: System, network and application security Cryptology Media securityBiometric systemsSpecification and formal verification of secure systems
Type of examination:	Examination performance / form: term paper Furthermore, regular participation in the seminar, an interim presentation and a final presentation
Media:	
Literature:	For literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Selected Chapters of IT Security 2
Engl. module name:	Selected Chapters of IT Security 2
Module level, (optional):	
Abbreviation:	ITSEC 2
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Seminar
Workload:	Seminar on selected organizational, legal, social and ethical topics of IT security, assignment of a challenging topic for independent work on and solution of a given task 2 SWS Attendance times and independent work see point "Credit points / ECTS" All degree programs except DKE;M: 3 credit points = 90h (28 h attendance time + 62 h independent work) DKE;M: 4 credit points = 120h (28 h attendance time + 92 h independent work)
Credit points / ECTS:	3 DKE: 4
Mandatory prerequisites :	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired skills: The student should acquire supplementary and up-to-date knowledge on selected organizational as well as legal, social and ethical topics in the focus area of security and cryptology within

	a seminar and acquire the ability to apply this knowledge. In doing so, he/she should independently work on a limited, challenging topic theoretically, analyzing various alternative solutions, and document this in writing.
Contents:	Current IT security challenges and solutions for selected organizational, legal, social and ethical topics such as:Security management Standardization, certification and evaluation Legal, ethical and social aspects of IT security Security in e-business Case studies on IT security
Type of examination:	Examination performance / form: term paper Furthermore, regular participation in the seminar, an interim presentation and a final presentation
Media:	
Literature:	For literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Selected Chapters of IT Security 3
Engl. module name:	Selected Chapters of IT Security 3
Module level, (optional):	
Abbreviation:	ITSEC 3
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills Key and methodological skills - Scientific team project
Teaching method / weekly hours:	Seminar
Workload:	Seminar on selected technical topics of IT security, assignment of a challenging topic for independent work on and solution of a set task 4 SWS 6 credit points = 180h (28 h attendance time + 152 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired skills: In a seminar focusing on security and cryptology, the student should learn and experience supplementary and up-to-date knowledge on selected technical topics using IT security as an example in order to be able to apply IT security strategies. He/she is expected to work independently on a comprehensive, challenging topic, both theoretically and practically, and document it in writing.
Contents:	

	Current IT security challenges and solutions for selected technical topics such as from: System, network and application security Cryptology Media securityBiometric systemsSpecification and formal verification of secure systems
Type of examination:	Examination performance / form: term paper Furthermore, regular participation in the seminar, an interim presentation and a final presentation
Media:	
Literature:	For literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Selected Chapters of IT Security 4
Engl. module name:	Selected Chapters of IT Security 4
Module level, (optional):	
Abbreviation:	ITSEC 4
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Chair of Applied Computer Science / Multimedia and Security Prof. Dr.-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr.-Ing. Jana Dittmann
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Key and methodological skills Key and methodological skills - Scientific team project
Teaching method / weekly hours:	Seminar
Workload:	Seminar on selected organizational, legal, social and ethical topics of IT security, assignment of a challenging topic for independent work on and solution of a given task 4 SWS 6 credit points = 180h (28 h attendance time + 152 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Secure systems, algorithms and data structures, fundamentals of computer engineering
Intended learning outcomes:	Learning objectives & acquired skills: The student should acquire supplementary and up-to-date knowledge on selected organizational as well as legal, social and ethical topics in the focus area of security and cryptology within a seminar and acquire the ability to apply this knowledge. In doing so, he/she should independently work on a comprehensive, challenging topic theoretically, analyzing various alternative solutions and document this in writing.
Contents:	

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	Current challenges and solutions in IT security on selected organizational, legal, social and ethical topics such as from: Security management Standardization, certification and evaluationLegal, ethical and social aspects of IT securitySecurity in e-businessCase studies on IT security
Type of examination:	Examination performance / form: term paper Furthermore, regular participation in the seminar, an interim presentation and a final presentation
Media:	
Literature:	For literature see under: http://omen.cs.uni-magdeburg.de/itiamsl/lehre/

English courtesy translation.
The German version is legally binding

Module title:	Selected Topics in Image Understanding
Engl. module name:	Selected Topics in Image Understanding
Module level, (optional):	
Abbreviation:	STIU
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship of Practical Computer Science / Image Processing, Image Understanding
Lecturer(s):	Professorship of Practical Computer Science / Image Processing, Image Understanding
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Project
Workload:	Attendance times: weekly lectures: 2 SWS Fortnightly project meetings: 2 SWS Independent work: Project preparation and implementation in small working groups Preparation of a project presentation Preparation and follow-up of the lecture material180h (56h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of linear algebra, basics of image processing, good knowledge of English
Intended learning outcomes:	Learning objectives & skills to be acquired: Competence in the algorithmic solution of advanced topics in digital image analysis Ability to carry out projects in a scientific-analytical environment Communication of scientific content in English
Contents:	Feature generation, feature mapping and feature reduction Geometric a-priori models for image understanding Classification techniques
Type of examination:	Examination prerequisite is required Exam: oral

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The German version is legally binding

Media:	
Literature:	http://wwwisg.cs.uni-magdeburg.de/bv/

English courtesy translation.
The German version is legally binding

Module title:	Seminar Computational Intelligence
Engl. module name:	Seminar Computational Intelligence
Module level, (optional):	
Abbreviation:	SCI
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Chair of Computational Intelligence
Lecturer(s):	Prof. Dr.-Ing. habil. Sanaz Mostaghim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Lecture Time: 2 Hours per Week: Seminar Individual Work Time 160h: - Reading and Understanding of Provided Papers - Research of Additional Papers - Writing - Presentation
Credit points / ECTS:	6 credits= 180 h = 20 h Lecture Time + 160 h Individual Work
Mandatory prerequisites :	
Recommended prerequisites:	Students should have basic knowledge from the area of computational intelligence, like for instance Intelligent Systems, Machine Learning, Evolutionary Algorithms, Swarm Intelligence, Multi-objective Optimization.
Intended learning outcomes:	- Capability to individually understand and research complex research topics - Writing of Scientific Articles - Presentation of Scientific Talks
Contents:	- Computational Intelligence - Machine Learning - Methods of Robotics - Evolutionary Algorithms - Multi-agent Scenarios and Systems - Optimization Algorithms
Type of examination:	Cumulative Examination as "oral presentation" consisting of: - Discussion - Presentation

	- Written Article
Media:	Introductory Lectures, Student Presentations
Literature:	Will be announced in the beginning of the lecture.

English courtesy translation.
The German version is legally binding

Module title:	Seminar Managementinformationssysteme
Engl. module name:	Seminar Management Information Systems
Module level, (optional):	
Abbreviation:	SemMIS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Understanding & Design FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Exercise; Seminar
Workload:	Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Independent work = 124 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic
Contents:	Selected topics on management information systems
Type of examination:	Examination prerequisite: - Examination: term paper (seminar paper)
Media:	
Literature:	Website: http://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module title:	Seminar Predictive Maintenance
Engl. module name:	Seminar Predictive Maintenance
Module level, (optional):	
Abbreviation:	PM
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	every semester
Module coordinator:	Myra Spiliopoulou, Benjamin Noack
Lecturer(s):	Myra Spiliopoulou, Benjamin Noack
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives
Teaching method / weekly hours:	Seminar
Workload:	Lecture Time: 2 Hours per Week: Seminar / Consultations Individual Work Time 130h (Bachelor) / 160h (Master): - Reading and Understanding of Provided Papers - Research of Additional Papers - Writing - Presentation
Credit points / ECTS:	Bachelor: 5 CP Master: 6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Students should have knowledge of linear algebra and calculus and, ideally, some knowledge of signal processing and data analysis
Intended learning outcomes:	- Independently research complex topics - Write clear scientific articles - Present informative and understandable scientific talks

Contents:	In this seminar, the participants will learn about - challenges and methods for data acquisition in industrial processing - data analysis tool in predictive maintenance - process modeling, fault detection, and state prediction
Type of examination:	- Presentation - Discussion - Scientific Article
Media:	Introductory lectures, consultations, student presentations
Literature:	Literature be announced in the seminar.

English courtesy translation.
The German version is legally binding

Module title:	Seminar Robotik
Engl. module name:	Seminar Robotik
Module level, (optional):	
Abbreviation:	SR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Benjamin Noack
Lecturer(s):	Benjamin Noack, Christopher Funk
Language:	---
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar
Teaching method / weekly hours:	Seminar
Workload:	2 SWS per week: attendance events / consultations Independent work: Working on and presenting the chosen topic, follow-up of the presentations (60 h) As WPF with 5 CP: Additional written paper (60 h)
Credit points / ECTS:	3 CP / 5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of linear algebra and analysis
Intended learning outcomes:	Participants learn to work independently on a given topic and present it to the other participants in an understandable way.
Contents:	Selected topics in the field of robotics will be discussed and presented during the seminar.
Type of examination:	-Scientific lecture - Discussion - Handout or scientific paper
Media:	
Literature:	

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The German version is legally binding

Module title:	Seminar: Text Retrieval/Mining
Engl. module name:	Seminar: Text Retrieval/Mining
Module level, (optional):	
Abbreviation:	TRM
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Data and Knowledge Engineering
Lecturer(s):	Prof. Dr.-Ing. Andreas Nürnberger
Language:	English
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Interdisciplinary team project FIN: M.Sc. DIGIENG - Digital Engineering Project FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	Time of attendance = 28 hours: lecture Independent work = 152 hours: pre- and post-work for lecture, literature research, practical task, submit paper of task
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Information Retrieval
Intended learning outcomes:	Enhance competence in the fundamentals of processing data with textual content. Applying text retrieval methods to solve relevant retrieval tasks. Confrontation with significant data magnitudes and their resulting challenges. Working with adequate literature.
Contents:	Selected topics in data/text processing from unification, normalization, indexing to retrieval applied to a significant magnitude of data.
Type of examination:	Successful implementation of a solution associated to a sub-problem in the Retrieval scenario and presentation of the result in form of a seminar-presentation and a written paper.
Media:	PowerPoint, whiteboard
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Service Engineering
Engl. module name:	Service Engineering
Module level, (optional):	
Abbreviation:	SOA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Practical Computer Science/Software Engineering
Lecturer(s):	Prof. Dr. A. Schmietendorf
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Understanding & Design FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time= 56h 2 SWS VL 2 SWS Exercise Independent work = 124 h Solution of (practical) exercises
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Software Engineering
Intended learning outcomes:	Basic understanding of service-oriented software systems Ability to define, conceptualize and adapt to SOA paradigms Skills in the application of web service technologies
Contents:	Basic concepts of architectures of industrial software systems SOA-based structures and paradigms Application and development aspects SOA on the basis of web service technologies
Type of examination:	Oral examination Appearance
Media:	
Literature:	Script provided by the lecturer

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The German version is legally binding

Module title:	Sichere Systeme
Engl. module name:	Secure Systems
Module level, (optional):	
Abbreviation:	SISY
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Jana Dittmann, FIN-ITI
Lecturer(s):	Jana Dittmann, FIN-ITI
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - Apply FIN: M.Sc. DIGIENG - Methods of Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 56h 2 SWS Lecture 2 SWS Exercise Self-employed work = 94h Solving the exercises & exam preparation150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	"Introduction to computer science" "Fundamentals of Theoretical Computer Science" "Fundamentals of Computer Engineering"
Intended learning outcomes:	Learning objectives & acquired skills: Ability to assess the reliability of IT security Ability to create threat analyses Ability to select and evaluate security mechanisms and create IT security concepts
Contents:	IT security aspects and IT security threats Design principles of secure IT systems Security guidelines Selected security mechanisms
Type of examination:	Regular participation in lectures and exercises: Grade: Examination (written, 120 min, no preliminary work) Schein: Announcement of the required preliminary work in the course
Media:	

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Literature:	For literature see http://wwwiti.cs.uni-magdeburg.de/iti_amsl/lehre/

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Module title:	Simulation dynamischer Systeme
Engl. module name:	Simulation dynamischer Systeme
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Strackeljan, FMB-IFME
Lecturer(s):	Prof. Strackeljan, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: Lecture 2 SWS, exercise 1 SWS, 1 SWS practical course, independent work: Follow-up of the lecture, independent exercise work, completion of several projects
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of mechanical vibrations, structural and machine dynamics
Intended learning outcomes:	Learning objectives and skills to be acquired Comprehensive knowledge in the field of converting real issues into modeling Comprehensive knowledge of model reduction Numerical knowledge for solving dynamic problems, time integration, manipulation of system matrices Consideration and estimation of nonlinearities in dynamic systems, understanding of the fundamental differences between linear and nonlinear dynamic systems, stability Modeling of different excitation systems (e.g. piezoceramics) Possibility to optimize dynamic systems Ability to evaluate and analyze the results of numerical simulations
Contents:	Brief review of the basics of spatial dynamics Integration process, model preparation Modeling of friction, various excitations harmonic and transient calculations Nonlinear dynamic systems, self-excitation, jump phenomena Treatment of selected prototypical applications (rubbing processes, rotors with cracks, special friction problems, driving dynamics, piezo-excited elastic vibration systems) Work with various program systems, including the EMD and FERAN programs Programming of interfaces to this program
Type of examination:	Examination prerequisite: Creation of a project Exam: oral exam

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Simulation Project
Engl. module name:	Simulation Project
Module level, (optional):	
Abbreviation:	SimProj
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Claudia Krull
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application FIN: B.Sc. WIF - WPF Design & Application - FIN SMK FIN: M.Sc. DIGIENG - Interdisciplinary team project FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area
Teaching method / weekly hours:	Project
Workload:	BSc - 150 hours (56 h attendance time + 94 h project work) MSc - 180 hours (56 h attendance time + 124 h project work)
Credit points / ECTS:	BSc 5; MSc 6
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to Simulation
Intended learning outcomes:	Learning objectives & acquired skills: Ability to work in a team, project work, milestone orientation Responsibility, leadership, delegation, coordination of tasks in a team Implementation of a practical simulation project Development of and compliance with success and quality criteria
Contents:	Basics of project management and teamwork Implementation of the contents of "Introduction to Simulation" in a real project.
Type of examination:	Examination performance Graded: Term paper Ungraded: Passing the term paper

Media:	
Literature:	

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Module title:	Simulation und Entwurf leistungselektronischer Systeme
Engl. module name:	Simulation und Entwurf leistungselektronischer Systeme
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr.-Ing. Andreas Lindemann (FEIT-IESY) / Dr.-Ing. Reinhard Döbbelin (FEIT-IESY)
Lecturer(s):	Prof. Dr.-Ing. Andreas Lindemann (FEIT-IESY) / Dr.-Ing. Reinhard Döbbelin (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lecture 2 SWS, bi-weekly exercises 1 SWS Independent work: Revising lectures, solving exercises, preparing for exams 3 SWS / 5 CP = 150h (42h attendance time + 108h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Basics of power electronics
Intended learning outcomes:	Learning objectives and skills to be acquired: In-depth knowledge and skills in the procedure for the simulative and metrological investigation and design of power electronic assemblies, devices and systems are taught. The exercise helps to illustrate the use of design tools and design work, taking into account the development trends of power electronic components.
Contents:	Circuit simulation of digital systems in power electronics with application examples Modeling of power electronic components Functional principle and application of digital measuring equipment in the development of power electronic systems Possibilities and application of signal analysis software Design of active and passive power electronic components
Type of examination:	Oral examination
Media:	
Literature:	

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The German version is legally binding

Module title:	Software Defined Networking
Engl. module name:	Software Defined Networking
Module level, (optional):	
Abbreviation:	SDN
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	FIN: Chair of Networks and Distributed Systems
Lecturer(s):	Prof. Dr. David Hausheer
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Engineering FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Lectures (2h per week) Theoretical and practical exercises (2 hours per week) Homework (124h): Further studies Implementation of the exercises Preparation for the final exam 180h (56h contact hours + 124h self-study) Grades according to examination regulations
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	The lecture Computer Networks is recommended
Intended learning outcomes:	Students gain an in-depth insight into Software Defined Networking and its applications.

Contents:	The course covers topics from the field of Software Defined Networking: SDN Architecture (Application, Control, Infrastructure Layer) SDN interfaces (North/South-bound vs. East/West-bound interface) SDN Applications and Use Cases (e.g. Multicasting) Network Virtualization and Slicing (e.g. FlowVisor) Network Function Virtualization (NFV) and Network Service Chaining SDN Security Network Operating Systems and Languages OpenFlow Controller (e.g. NOX, Beacon, etc.) Hardware switches (e.g. NEC IP8800, Pronto) vs. software switches (e.g. NetFPGA, OpenVSwitch) SDN in wireless networks (e.g. OpenWRT)
Type of examination:	Written examination
Media:	
Literature:	Textbooks according to announcement. Lecture slides and copies of articles as required.

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Module title:	Software Development Project
Engl. module name:	Software Development Project
Module level, (optional):	
Abbreviation:	SDP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Prof. Frank Ortmeier
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. CV - Key and methodological skills FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INF - Key and methodological skills FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. INGINF - Key and methodological skills FIN: B.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Exercise
Workload:	300h = 50h attendance time + 190h project work + 60h independent exam preparation
Credit points / ECTS:	10
Mandatory prerequisites :	none
Recommended prerequisites:	Introduction to computer science, software engineering + IT PM, databases
Intended learning outcomes:	Knowledge of modern software development processesKnowledge of modern frameworks for software development, especially in the web contextPractical experience in the software development of larger software projectsDecision-making competence in the application of various software development methods for software development in an industrial and academic context
Contents:	Software development environmentSoftware (architecture) documentationVersioning and continuous integrationAutomated testingIssue tracking and handling of programming errorsCode analysis and software development processes incl. use of ML-based support systems
Type of examination:	

	- Exam: oral exams on individual milestones - Ungraded proof of performance: Passing the oral examinations
Media:	
Literature:	

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Module title:	Software Engineering & IT-Projektmanagement
Engl. module name:	Software Engineering & IT-Projektmanagement
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Dr. Thomas Wilde
Lecturer(s):	Dr. Thomas Wilde
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Lecture 2 SWS = 28h attendance time Exercise 2 SWS = 28h attendance time 94h independent work --- total 150h
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	Introduction to computer science, Algorithms and data structures
Intended learning outcomes:	Software Engineering: After the course, participants will have knowledge of the entire software life cycle from specification to design, development, validation and maintenance. Participants will be familiar with various process models and understand the interaction of process activities within them. Basic knowledge of design guidelines and patterns can be reproduced. Practical examples are used to apply the acquired knowledge with the help of current tools and techniques. IT project management: Participants acquire knowledge of project management methods with reference to software development. The basic functions of agile methods can be named. Tools and methods for project management are applied.
Contents:	

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	- Software engineering - what is it and what is it used for? - Process models: Waterfall Model, Incremental Model, Integration and Configuration - Process activities: specification, development, validation, evolution - Test & Debugging - Agile software development - Tools & Tools - Clean coding / code conventions - practical examples
Type of examination:	Examination prerequisite required Exam: written exam, 120 minutes Appearance
Media:	
Literature:	Ian Sommerville - Software Engineering Robert Marting - Clean Code: A Handbook of Agile Software Craftsmanship

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Module title:	Software Engineering (SPO bis 9/2023)
Engl. module name:	Software Engineering
Module level, (optional):	
Abbreviation:	SE
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Summer semester
Module coordinator:	Dr. Thomas Wilde
Lecturer(s):	Dr. Thomas Wilde
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and data structures, modeling
Intended learning outcomes:	Knowledge and application of various development processes Experience with use case and requirements engineering techniques Software design guidelines and patterns Overview of modern SE technologies/techniques
Contents:	The aim is to teach techniques and tools that are inevitable in the development of large software projects. During the semester, the entire development cycle from the first requirement to the software design to the creation of the documentation will be played through. The course is aimed at all computer science bachelor students.
Type of examination:	Examination prerequisite required Exam: written exam, 120 minutes
Media:	
Literature:	

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The German version is legally binding

Module title:	Software Engineering for technical applications
Engl. module name:	Software Engineering for technical applications
Module level, (optional):	
Abbreviation:	SE4TA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IVS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Understanding the special challenges of software development for technical systemsModeling software parts of technical systems Model-based software design with SCADE
Contents:	Development processes for software in technical systemsModeling with SysML Software development for critical systems with SCADE
Type of examination:	Examination prerequisite required Exam: oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Software Testing
Engl. module name:	Software Testing
Module level, (optional):	
Abbreviation:	SWT
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	PD Dr.-Ing. Sandro Schulze
Lecturer(s):	PD Dr.-Ing. Sandro Schulze
Language:	English
Assignment to the curriculum:	FIN: B.Sc. BiBaINF - WPF Computer Science FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Project
Workload:	150 h overall ? 44 class hours + 76 complementary reading and realization of exercises + 30 hours of exam preparation
Credit points / ECTS:	Bachelor: 5CP Master: 6CP
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of software engineering, good programming skills (mandatory)
Intended learning outcomes:	Knowledge and Understanding:Participants understand the most important testing techniques needed to build high quality software systemsParticipants can apply modern testing techniques to create high quality software systemsParticipants can reflect about limitations of current testing techniques, know when and when not to apply them, and are aware of latest research developments aimed at addressing these limitations. Intellectual and Practical SkillsStudents know about quality attributesstudents identify appropriate testing type and technique for given problems and quality attributesadapt and execute respective algorithms to apply a concrete testing techniqueinterpret testing results and execute corresponding

	techniques for re-test scenariosapply bug-finding techniques for non-trivial problemsget familiar with git, maven, Eclipse, JUnit, and Cobertura and apply them to a small program Communication and Interpersonal skills:discuss problems and their possible solutions in classwork together in groups to solve tasks in exercises à need to discuss and self-organize to achieve the goal; requires intensive communication among each othercommunicating in Engl.ish
Contents:	Introduction to:Test Process (& its relation to software development process) and testing terminologyQuality attributes, maintainability, and testabilityFoundations of static & dynamic testingCode reviews and inspectionConcrete dynamic testing techniques (black-box, white-box), including corresponding test design techniques and coverage criteriaTest-driven design and developmentModel-based and state-based testingDesign-by-contractUnit vs. integration testing
Type of examination:	Written examination + labwork/assignments + quizzes - labwork/assignments must be solved in order to get the exam permission
Media:	Live coding, paper reading, online quizzes, discussion groups, guest lectures
Literature:	Rex Black, Erik Van Veenendaal, Dorothy Graham (2012), Foundations of Software Testing - ISTQB Certification, 3rd ed. Basic knowledge of software testing, Spillner et al. P. Ammann and J. Offutt, "Introduction to Software Testing", 2nd edition 2015. Additional literature (papers, blogs, books) is provided during the lectures

English courtesy translation.
The German version is legally binding

Module title:	Software Development for Industrial Robotics
Engl. module name:	Software Development for Industrial Robotics
Module level, (optional):	
Abbreviation:	SDIR
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IVS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INF - WPF Computer Engineering FIN: B.Sc. INGINF - WPF Computer Engineering FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	180h = 4 SWS = 56h attendance time + 224h independent work on the internship project
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Understanding of problems in the robotics domainUnderstanding and applicability of the mathematical background Practical experience in programming industrial robots based on various tasks
Contents:	The use of industrial robots is increasing rapidly these days. In 2014, the expected number of industrial robots increased by 27% compared to the previous year. The main reason is their flexibility, especially their ability to perform a wide range of tasks. In the lecture "Software-Development for Industrial Robotics" an overview of this domain is given as well as the mathematical background. The latter deals in particular with the idea of forward and inverse kinematics, point-to-point movements, linear movements, trajectory planning, recognition of singularities, Denavit-Hartenberg convention, rotation and

	translation matrices. The final project deals with control using a collision-free path planner, KUKA youBot kinematics, numerical approaches to solving inverse kinematics, etc.
Type of examination:	Examination: scientific project
Media:	
Literature:	

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Module title:	Softwareprojekt
Engl. module name:	Software Project
Module level, (optional):	
Abbreviation:	SWP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Software project FIN: B.Sc. INF - Key and methodological skills - Software project FIN: B.Sc. INGINF - Key and methodological skills - Software project FIN: B.Sc. WIF - Design
Teaching method / weekly hours:	Project
Workload:	Attendance times = 0 h (course-specific) Independent work = 180 h Project work in teams
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	IT project management module
Intended learning outcomes:	Learning objectives & acquired skills: Teamwork (in particular assigning and accepting responsibility, leadership, delegation and agreement of tasks, agreement of cooperation criteria) Project work (in particular agreement on objectives, specifications and requirements, planning of milestones and work packages, project implementation, documentation and presentation of a project and its results) Creation of a software package in a team This module is implemented through various courses. Subject-specific teaching objectives are offer-specific.
Contents:	Implementation of a software development project in a team Application of the contents of the IT project management module This module is implemented through various courses. The subject-specific content is offer-specific.

Type of examination:	Graded: Cumulative: Implementation, documentation and acceptance of a software project Ungraded: Passing of the graded performances This module is implemented through different courses. Type of examination are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	

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Module title:	Softwareprojekt (dual)
Engl. module name:	Software Project (dual)
Module level, (optional):	
Abbreviation:	SWP
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Software project FIN: B.Sc. INF - Key and methodological skills - Software project FIN: B.Sc. INGINF - Key and methodological skills - Software project FIN: B.Sc. WIF - Design
Teaching method / weekly hours:	Project
Workload:	Attendance times = 0 h (course-specific) Independent work = 180 h Project work in teams
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	IT project management module
Intended learning outcomes:	Learning objectives & acquired skills: Teamwork (in particular assigning and accepting responsibility, leadership, delegation and agreement of tasks, agreement of cooperation criteria) Project work (in particular agreement on objectives, specifications and requirements, planning of milestones and work packages, project implementation, documentation and presentation of a project and its results) Creation of a software package in a team and in cooperation with the practice partner This module is implemented through various courses. Subject-specific teaching objectives are offer-specific
Contents:	Implementation of a software development project in a team Application of the contents of the IT project management module This module is implemented through various courses. The subject-specific content is offer-specific.

Type of examination:	Graded: Cumulative: Implementation, documentation and acceptance of a software project Ungraded: Passing of the graded performances This module is implemented through different courses. Type of examination are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	

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The German version is legally binding

Module title:	Softwareprojekt RIOT OS
Engl. module name:	Softwareprojekt RIOT OS
Module level, (optional):	
Abbreviation:	RIOT-Lab
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship of Computer Engineering / Communication and Networked Systems
Lecturer(s):	Prof. Dr. Mesut Güneş
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Software project FIN: B.Sc. INF - Key and methodological skills - Software project FIN: B.Sc. INGINF - Key and methodological skills - Software project
Teaching method / weekly hours:	Project
Workload:	Attendance time = 56 h 4 SWS Project seminar Independent work = 124 h Processing the programming tasks
Credit points / ECTS:	6 CP
Mandatory prerequisites :	none
Recommended prerequisites:	Computer Engineering 1Computer Engineering 2 Computer networksAlgorithms and data structures
Intended learning outcomes:	In-depth understanding of operating systems for embedded systems, especially in the context of the Internet of ThingsAbility to develop applications for embedded systemsDriver development and system developmentUse of version management systems
Contents:	Introduction to tools such as Git, Make, etc.Introduction to RIOT OSApplication developmentMulti-threadingDriver developmentNetwork communication
Type of examination:	Services: Regular participation in the project seminar Successful completion of the programming tasks Exam:Final presentation
Media:	
Literature:	Will be announced in the course.

Module title:	Sozialwissenschaftliche Filmanalyse

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Engl. module name:	Film Analysis in the Social Sciences
Module level, (optional):	
Abbreviation:	SWF
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Lesske, Frank
Lecturer(s):	Lesske, Frank
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Seminar
Workload:	Seminar 4 SWS
Credit points / ECTS:	3-6 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge of social science media analysis, especially film and computer gamesAbility to critically analyze cinematic means and forms of communication with regard to technical and visual implementation
Contents:	In the seminars of this module, films are selected according to different content-related aspects and socially relevant thematic focuses and examined with regard to content-related statements, forms of mediation, mediation services and their technical and creative implementation.
Type of examination:	Lecture with thesis paper or presentation depending on the desired CP additionally written term paper or oral examination
Media:	
Literature:	Faulstich, Werner: Grundkurs Filmanalyse; Stuttgart 2008Hickethier, Knut: Film- und Fernsehanalyse; Stuttgart [u.a.] 2001, 3rd, revised ed. Korte, Helmut: Introduction to Systematic Film Analysis; Berlin 1999 Monaco, James: Understanding Film: The art, technique, language, history and theory of film and new media; with a lexicon of technical terms; Hamburg [u.a.] 2000

English courtesy translation.
The German version is legally binding

Module title:	Speicherprogrammierbare Antriebssteuerungen
Engl. module name:	Speicherprogrammierbare Antriebssteuerungen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Dipl.-Ing. Andreas Bannack (FEIT-IESY)
Lecturer(s):	Dipl.-Ing. Andreas Bannack (FEIT-IESY)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Attendance times: fortnightly lecture 2 SWS, tutorial 1 SWS, laboratory practical course alternating 2 SWS Independent work: Reworking the lecture, solving exercises
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Electrical machinesElectrical drives 1 Control engineering Regulated electric drives
Intended learning outcomes:	Learning objectives: Teaching basic knowledge of programmable logic drive control Development of skills for practical handling of industrial control systems
Contents:	Tasks and areas of application of PLC control circuits for asynchronous machines Binary control technology PLC systems for drive controls Binary machine and system controls Programming exercises on PLC-controlled drive systems Control of motion control systems Programmable logic controllers
Type of examination:	Oral examination
Media:	
Literature:	

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Module title:	Spezifikationstechnik
Engl. module name:	Introduction to Specification
Module level, (optional):	
Abbreviation:	SPT
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship for Software Engineering
Lecturer(s):	Frank Ortmeier, FIN-IVS
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 h = 4 SWS = 56 h attendance time + 94 h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Algorithms and Data Structures, Theoretical Computer Science
Intended learning outcomes:	Familiarity with methods of formal specificationAbility to assess for which software artifacts the use of formal specification makes sense. Knowledge of the potential and limitations of formal methods
Contents:	Formal versus informal specificationSpecification, validation, verification, generation Specification of abstract data types Specification of time sequences and processes, application example: protocol specification Concrete specification languages and tools
Type of examination:	Examination prerequisite required Exam: oral exam
Media:	
Literature:	

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Module title:	Sprachverarbeitung
Engl. module name:	Speech Processing
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Cognitive Systems / Language Processing
Lecturer(s):	Professorship for Cognitive Systems / Language Processing
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Image Information Technology FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times 2SWS (lecture) + 1SWS exercise (optional) Independent work: Lecture follow-up, literature study 90h (28h attendance time in the lectures + 62h independent work)
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of analog and digital signal processing helpful
Intended learning outcomes:	Learning objectives & skills to be acquired: Teaching the basic problems and methods of automatic language processing with Hidden Markov Models. The participant understands the functionality of the main modules of an automatic language processing system and can justify the functional principles mathematically. The participant can differentiate between applications in DSPs and CPUs and name the specific requirements. The same applies to the different requirements commands, dictation, dialog, recognition of large vocabularies, user adaptation. In a subsequent practical course (optional), participants can program the individual modules under supervision and assemble their own speech recognizer
Contents:	The course focuses on the communicative aspects of spoken language. It describes the human speech production process and its modeling using (linear) models. Automatic speech

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	processing carried out with computers is presented mathematically and practically. Classification methods, hidden Markov models, production of acoustic features and aspects of dialog strategy are discussed. The individual contents are: Overview of speech recognition systems and architectures From physiological speech production and reception to the technical model Language models Speech processing with digital signal processors Basics of digital signal processing Feature extraction Probability calculation and estimation theory Classification Hidden Markov models Large vocabulary Speech comprehension and dialog control
Type of examination:	Written exam (K 90) or oral exam Examination prerequisites according to announcement
Media:	
Literature:	Wendemuth, A (2004): "Grundlagen der Stochastischen Sprachverarbeitung", 279 pages, Oldenbourg, ISBN: 3-486-57610-0 www.kognitivesysteme.de

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The German version is legally binding

Module title:	Startup Engineering I
Engl. module name:	Startup Engineering I
Module level, (optional):	
Abbreviation:	SE-I
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Study profile - Web founder FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150 hours (56 h attendance time + 94 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The participants know and understand the success factors of startups, the management of a startup according to the "lean" philosophy and the methods used and have applied them themselves using given examples.
Contents:	Lean Startup Plausibility check of the minimum business model Assessment of the market potential Problem-solution fit and product-market fit Customer Journey Map Validation of start-up hypotheses
Type of examination:	Examination performance Graded: Term paper Ungraded: Passing the term paper
Media:	
Literature:	Eric Ries: The Lean Startup Various internet sources (will be announced in the course)

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Module title:	Startup Engineering II - Develop an MVP
Engl. module name:	Startup Engineering II - Develop an MVP
Module level, (optional):	
Abbreviation:	SE-II
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Project
Workload:	180 hours (28 h attendance time + 152 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Programming skills Successful completion of an independent programming project
Intended learning outcomes:	Participants understand the role of hypothesis in the preparation phase of a startup and the validation of this through an MVP. Participants have experience in developing an MVP for a startup using a current technology.
Contents:	Specification, creation and testing of an MVP to test a hypothesis.
Type of examination:	Examination prerequisite: will be announced at the beginning of the course: Term paper
Media:	Individual choice of participants
Literature:	Internet research. Indications are given.

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Module title:	Startup Engineering III - From Idea to Business
Engl. module name:	Startup Engineering III - From Idea to Business
Module level, (optional):	
Abbreviation:	SE-III
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Graham Horton
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture; Seminar; Project
Workload:	180 hours (56 h attendance time + 124 h project work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Startup Engineering I + II
Intended learning outcomes:	The participants have learned ... How to run a startup according to the "lean" principle How to develop and validate a competitive business model How to prepare and give investor presentations How to create product specifications How working in a founding team works
Contents:	Lean Startup Method Market analysis MVP -Minimum Viable Product Problem/Solution fit Product/Market fit
Type of examination:	Examination performance Graded: Term paper
Media:	
Literature:	See www.sim.ovgu.de

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The German version is legally binding

Module title:	Steuerung großer IT-Projekte
Engl. module name:	Steuerung großer IT-Projekte
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Practical Computer Science / Computational Intelligence
Lecturer(s):	Dr. Karl Teille, Volkswagen AutoUni, Head of the Institute of Computer Science
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture
Workload:	2 SWS Lecture Independent work: Processing term paper, follow-up lecture 60h = 28h attendance time + 32h independent work
Credit points / ECTS:	2
Mandatory prerequisites :	
Recommended prerequisites:	Knowledge of a software development process. First experience with groups or project work.
Intended learning outcomes:	Understanding the importance of projects in professional practiceKnowing the differences between project work and line work Recognizing the impact of corporate and project culture on project success Know classic project management disciplines Know agile project management methods Be able to evaluate aspects of international project work
Contents:	Definition of project typesProject goals in the magic square Factors influencing the project and corporate culture Project work using the example of the SW development process Nine disciplines of project management according to PMI

	Impact of changes to the project objectives during the project term Aspects of agile project work Aspects of international project work
Type of examination:	Term paper
Media:	
Literature:	Der Termin - A novel about project management. Tom DeMarco; HANSER; 1998Wien wartet auf Dich - Der Faktor Mensch im DV-Management. Tom deMarco, Timotthy Lister; HANSER; 1999 Agile project management - risk-driven software development. Christiane Gernert; HANSER: 2003 Project survival - 10 project traps and how to avoid them. Klaus D. Tumuscheit; Orell Füssli Publishers; 1999 Project management with system - organization, methods, control. Georg Kraus, Reinhold Westermann; Gabler; 1998 Project Manager Practice. Jürgen Hansel, Gero Lomnitz; Springer; 1999 Paradigm Shift - The New Promise of Information Technology Don Tapscott; McGraw-Hill; 1993 Bärentango - Mit Risiko-management Projekte zum Erfolg führen. Tom DeMarco, Timothy Lister; HANSER; 2003 Drachentöter - Risk management for software projects. Georg Erwin Thaller; HEISE; 2004 Quality management in IT projects - planning, organization, implementation. Sandra Bartsch-Beuerlein; Hanser; 2000 Business Etiquette China. http://www.boersen-verein.de/sixcms/media.php/976/Businessknigge-China.pdf

Module title:	Steuerungstechnik
Engl. module name:	Discrete control systems
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Winter semester
Module coordinator:	Professorship for Automation Technology and Modeling
Lecturer(s):	Dr.-Ing. Jürgen Ihlow
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Electrical Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 1 SWS Lecture 1 SWS exercise Independent work: Solving the exercises (preparatory work before the exercise)60h = 2 SWS = 28h attendance time + 32h independent work
Credit points / ECTS:	2
Mandatory prerequisites :	
Recommended prerequisites:	Mathematics, electrical engineering, physics
Intended learning outcomes:	Learning objectives and skills to be acquired: Introduction to the theory of discrete systems and the mathematical tools required for their treatment Teaching skills for the design and realization of combinatorial and sequential control systems
Contents:	Introduction Control/ regulation, signals, combinatorial and sequential control Basics of BOOLE algebra One- and two-digit BOOLE functions, representation of BOOLE functions, arithmetic laws, normal forms, derivation of BOOLE functions Minimization procedure Prime implicant, minimal normal forms, Karnaugh's method, McCluskey's approximation method, Quine- McCluskey's method Design of combinatorial controls

	Design steps, signal definitions, modeling in the form of a circuit assignment table, minimization, structuring Realization of combinatorial controls Contact circuits, contactless circuits Fundamentals of automata theory Definition of automata, models of automata, types of automata, methods of state reduction Design of sequential controls Design steps, signal definition, modeling, state coding, state reduction Realization of sequential controls Controls, free feedback, concentrated storage elements, storage types
Type of examination:	Exam: written
Media:	
Literature:	Zander, H. J.: Logischer Entwurf binärer Systeme, Verlag Technik, Berlin 1989Leonhardt, E.: Grundlage der Digitaltechnik, Carl Hanser Verlag, Munich, 1984 Borgmeyer, J:: Grundlage der Digitaltechnik, Carl Hanser Verlag, Munich, 1997

English courtesy translation.
The German version is legally binding

Module title:	Strömungsmechanik I
Engl. module name:	Strömungsmechanik I
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. habil. Dominique Thévenin
Lecturer(s):	Prof. Dr.-Ing. habil. Dominique Thévenin
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Process Engineering
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

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The German version is legally binding

Module title:	Student Conference
Engl. module name:	Student Conference
Module level, (optional):	
Abbreviation:	StudConf
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Gunter Saake
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Lecture
Workload:	Three rounds of paper submission, two rounds of reviews, three presentations
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Knowledge about scientific writingCapability to review scientific articles Experiences with scientific conferences Usage of web-based submission and review systems
Contents:	Scientific writingConference organization Survey of research literature Assessment of other student's work Final presentation in a conference-like event
Type of examination:	seminar paper (Paper + Reviews)Presentation
Media:	
Literature:	

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The German version is legally binding

Module title:	Swarm Intelligence
Engl. module name:	Swarm Intelligence
Module level, (optional):	
Abbreviation:	SI
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Intelligent systems
Lecturer(s):	Prof. Dr.-Ing. Sanaz Mostaghim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Learning Methods & Models for Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: 2 SWS Lecture 2 SWS Exercises Independent work: Work on exercises and programming tasks 180 h = 56 h attendance time + 124 h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Computer science (algorithms and data structures, machine learning)
Intended learning outcomes:	Application of swarm intelligence methods for problem solving (optimization and distributed systems)Ability to develop swarm intelligence algorithms
Contents:	Introduction to swarm intelligence (modeling and definitions)Swarm intelligence in optimization (modeling, ant colony optimization, particle swarm optimization, multiobjective optimization) Swarm intelligence in dynamic environments Swarm intelligence for grouping and sorting tasks Swarm robotics

Type of examination:	To pass the examination or obtain a certificate, the following requirements must be met: - Regular attendance and participation in lectures and exercises - Acquisition of the admission requirements for the exam - Passing the written exam, 120 min. The admission requirements can consist of various elements, e.g. solving and presenting exercises or passing an intermediate exam in the semester. The exact admission requirements will be announced at the beginning of the lecture, at the latest by the end of the third week of lectures, on the chair's website.
Media:	
Literature:	Eric Bonabeau, Marco Dorigo and Guy Theraulaz, Swarm Intelligence: From Natural to Artificial Systems, Oxford University Press, 1999Andries Engelbrecht, Fundamentals of Computational Swarm Intelligence, Wiley 2006 James Kennedy and Russel Eberhart, Swarm Intelligence, Morgan Kaufmann, 2001 Zbigniew Michalewicz and David Fogel, How to solve it: Modern Heuristics, Springer, 2001 Veysel Gazi, Stability Analysis of Swarms, The Ohio State University, 2002 Marco Dorigo and Thomas Stützle, Ant Colony Optimization, The MIT Press, 2004 C. Solnon: Ant Colony Optimization and Constraint Programming. Wiley 2010 Gerhard Weiss, Multiagent Systems: A modern approach to distributed artificial systems, The MIT Press, 2000 Christian Müller-Schloer, Hartmut Schmeck and Theo Ungerer, Organic Computing - A Paradigm Shift for Complex Systems, Springer, 2011

English courtesy translation.
The German version is legally binding

Module title:	System-on-chip
Engl. module name:	System-on-chip
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Lecturer(s):	Prof. Dr.-Ing. Thilo Pionteck (FEIT-IIKT)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. INGINF - Engineering Sciences
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS, bi-weekly exercises 1 SWS Independent work: Reviewing lectures, solving exercises and preparing for exams 180 h (42 h attendance time + 138 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Bachelor's degree in electrical engineering, mechatronics or computer science
Intended learning outcomes:	Learning objectives and acquired skills: After successfully completing the module, students will have detailed knowledge of the structure of system-on-chips (SoCs) and their individual components. They will be able to make design decisions independently, weigh up design alternatives and evaluate existing designs with regard to their suitability for a given application scenario. Students will be able to name current trends in the design and use of SoC and place them in the overall context. Through exercises, students are able to deepen their knowledge and skills in a research-oriented manner and apply and evaluate them in complex problems.
Contents:	Design of System-on-Chips (SoCs)Intellectual Property Core (IP-Core) based design Design Reuse ARM processors Communication networks

	Network-on-Chips (NoCs) Memory types and memory hierarchy 3D systems Clock domains Power management Testing and reliability Case studies
Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Technische Aspekte der IT-Sicherheit
Engl. module name:	Technical Aspects of IT-Security
Module level, (optional):	
Abbreviation:	TAITS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Prof. Dr-Ing. Jana Dittmann
Lecturer(s):	Prof. Dr-Ing. Jana Dittmann
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - ForensicsDesign@Informatics FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	150h: attendance time = 56h, independent work = 94h
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	"Secure Systems", Computer Engineering, Communication and Networks, "Algorithms and Data Structures"
Intended learning outcomes:	Learning objectives: Understanding the special characteristics and problems of hardware-related security solutions (communication protocols, environment dependency, resource restrictions) Competencies: Ability to design and implement customized security solutions based on an application problem
Contents:	Development of a practice-relevant, hardware-related application problem from areas such as automotive safety, IoT or control and regulation technologyIntroduction to sensor technology and communication technologiesTechnical integration aspects, implementation of selected content from "Safe Systems" and "Algorithms and Data Structures"
Type of examination:	Examination form: presentation (presentation and final report)
Media:	
Literature:	For literature, see wwwiti.cs.uni-magdeburg.de/iti_amsl/lehre/,

English courtesy translation.
The German version is legally binding

Module title:	Technische Darstellungslehre
Engl. module name:	Engineering Design Graphics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	---
Module coordinator:	Prof. Beyer; FMB - IMK
Lecturer(s):	Prof. Beyer; FMB - IMK Other lecturers: Dr. Träger, Dr. Schabacker; FMB-IMK
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Application Subject - Construction & Design
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Technische Informatik I
Engl. module name:	Principles of Computer Hardware
Module level, (optional):	
Abbreviation:	TI-I
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Lecturer(s):	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: SWS Lecture SWS Exercise Independent work: Processing of exercises and programming tasks & exam preparation 150h = 4 SWS = 56h attendance time + 94h independent work.
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Ability to understand and describe the basic structure of computers as a layered model of different levels of abstraction Competence to independently design components of the digital logic level, In-depth knowledge of the machine level of a digital computer. Understanding the principles of increasing performance through assembly line and parallel processing
Contents:	Combinatorial switching networksSequential switching networks Computer arithmetic Structure of a computer Command set and addressing

	Conveyor belt and parallel processing
Type of examination:	Services: Completion of the exercises and programming tasks Exam: Written exam 120 min.
Media:	
Literature:	Will be announced in the VL

English courtesy translation.
The German version is legally binding

Module title:	Technische Informatik II
Engl. module name:	Principles of Resource Management and Communication
Module level, (optional):	
Abbreviation:	TI II
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Lecturer(s):	Professorship of Computer Engineering / Communication and Networked Systems; Professorship of Networks and Distributed Systems
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - Compulsory subjects FIN: B.Sc. INGINF - Compulsory subjects FIN: B.Sc. WIF - WPF Design & Application
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS Lecture 2 SWS Exercise Independent work: Processing of exercises & exam preparation 150h = 4 SWS = 56h attendance time + 94h independent work.
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	Computer Engineering I
Intended learning outcomes:	Learning objectives: Teaching the basics of classifying and designing architectures and components of system software from the areas of operating systems, communication systems and network architectures. Competencies: Ability to evaluate and practically implement concepts, components and structures from the above-mentioned areas on a system-related software layer.
Contents:	Contents Design principles and abstractions System resources and activity structures Communication and synchronization

	Examples of resource management and Protocols from the area of operating and Network architectures
Type of examination:	Services Regular participation in lectures and exercises, Processing the exercise and programming tasks Exam: Written exam 120 min
Media:	
Literature:	will be announced on the VL website

English courtesy translation.
The German version is legally binding

Module title:	Technische Logistik
Engl. module name:	Technical Logistics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Prof. Zadek, FMB-ILM
Lecturer(s):	Prof. Zadek, FMB-ILM; Further lecturers: K. Hempel; FMB-ILM
Language:	---
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Technische Mechanik 1
Engl. module name:	Engineering Mechanics 1
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	Summer semester
Module coordinator:	Prof. Juhre, FMB-IFME
Lecturer(s):	Prof. Juhre, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Technische Mechanik 2/3
Engl. module name:	Engineering Mechanics 2/3
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Prof. Juhre, FMB-IFME
Lecturer(s):	Prof. Juhre, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering
Teaching method / weekly hours:	
Workload:	
Credit points / ECTS:	5 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	
Contents:	
Type of examination:	
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Technische Mechanik I
Engl. module name:	Technische Mechanik I
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Jens Strackeljan, Prof. A. Bertram, FMB-IFME
Lecturer(s):	Prof. Jens Strackeljan, Prof. A. Bertram, FMB-IFME
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Engineering fundamentals for computer scientists
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS Lecture 3 SWS Exercise self. Work: Exercises; exam preparation 210 h (84 h attendance time + 126 h s. work)
Credit points / ECTS:	7
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Teaching basic knowledge of methods of engineering mechanics Explanation of the methodical approach: solving problems of statics using basic principles of engineering mechanics Basic knowledge in the field of strength Consolidation of knowledge in exercises by modeling and calculating simple technical systems
Contents:	Fundamentals of statics: Planar and spatial force systems, internal loads on beam and bar structures, friction and adhesion, center of gravity calculation Fundamentals of strength of materials: Assumptions, definition of deformations and stresses, Hooke's law, tension and compression, bending; stability problems
Type of examination:	Exercise certificate; written exam 120 min
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Telematik und Identtechnik
Engl. module name:	Telematik und Identtechnik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Hon. Prof. Richter /ILM
Lecturer(s):	Hon. Prof. Richter /ILM
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: Lecture: 2 SWS Exercise: 1 SWS (fortnightly) Independent work: Follow-up of the lecture and exercises
Credit points / ECTS:	5
Mandatory prerequisites :	Conveyor Technology (Master MB)
Recommended prerequisites:	
Intended learning outcomes:	Learning skills for commissioning and using radio and image-based identification, positioning and communication technologiesDesign of telematics systems for long process chains in logistics and intralogistics tasks
Contents:	Video-based systems (camera, pattern recognition)RFID systems for identification (readers, multiplexers, antennas) RF and image processing systems for localization in intralogistics Low cost depth image scan Complex solutions (intelligent container, RFID Kanban, RFID in the fashion industry, freight scanning)
Type of examination:	Participation in lectures and exercises; Internship in the Galileo test field; test laboratory and container terminal Magdeburg Written examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Theoretische Elektrotechnik
Engl. module name:	Theoretische Elektrotechnik
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Dr.-Ing. Marco Leone (FEIT-IGET)
Lecturer(s):	Prof. Dr.-Ing. Marco Leone (FEIT-IGET)
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times in the summer semester: 2 SWS lecture, 1 SWS exercise Attendance times in winter semester: 2 SWS lecture, 1 SWS exercise Independent work: Solving the exercises and exam preparation 240 h (84 h attendance time + 156 h independent work)
Credit points / ECTS:	8
Mandatory prerequisites :	GET 1 and 2 and GET 3
Recommended prerequisites:	
Intended learning outcomes:	Teaching the system of Maxwell's equations as a basis for the physical understanding and mathematical description of electrical, magnetic and electromagnetic phenomenaSystematic treatment of electromagnetic fields and adequate calculation methods as well as establishing the reference to real problems in the fields of electrical engineering, electronics and communication technology Development of skills for solving specific tasks
Contents:	Maxwell's equations in differential and integral form and the derivation of general conclusions as well as a classification of electromagnetic fields, on the basis of which the individual field types are then dealt with. Electrostatic field, stationary electric flow field, magnetic field of stationary currents, quasi-stationary electromagnetic field, wave fields
Type of examination:	Written exam 180 min

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Theorie elektrischer Leitungen
Engl. module name:	Theorie elektrischer Leitungen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. M. Leone, FEIT-IGET
Lecturer(s):	Prof. Dr.-Ing. M. Leone, FEIT-IGET
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture, 1 SWS exercise Independent work: Exercises, exam preparation 120 h (42 h attendance + 78 h independent work)
Credit points / ECTS:	4
Mandatory prerequisites :	Fundamentals of Electrical Engineering I-III, Theoretical Electrical Engineering
Recommended prerequisites:	
Intended learning outcomes:	In-depth physical insight into equalization and propagation processes on line connections with rapid temporal changes or high frequencies, if their expansion cannot be neglected with regard to the delay time or wavelength Knowledge of the basic solutions and approximation models in special cases from the fields of energy technology, electronics/circuit technology and communication technology Mathematical description and analysis of dynamic processes on lines in the time and frequency domain with any line circuit: line equations in complex form, reflection factor, ripple, resistance transformation, Smith chart, four-pole equivalent circuits, chain conductors Multiple lines: Line differential equation system, parameter matrices, modal transformation.
Contents:	Introduction: Conducted electromagnetic waves and wave types, TEM waves on lines: Derivation of differential equations and differential equivalent circuit of double line, solution in time and frequency domain, lossless and lossy case, phase & group velocity.

	Non-stationary analysis in the time domain: Simple compensation processes, reflection and refraction, wave equivalent circuit diagrams, multiple reflection (wave timetable, Bergeron method, network (SPICE) model of the double line, pulse behavior with dispersive lines Stationary analysis in the frequency domain: current and voltage along the lossy line, four-pole representation, impedance transformation. Multiple lines: Definition and differential equivalent circuit, line equations and wave equation, modal (eigenwave) solution, line crosstalk
Type of examination:	Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Three-dimensional & Advanced Interaction
Engl. module name:	Three-dimensional & Advanced Interaction
Module level, (optional):	
Abbreviation:	TAI
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	AG Visualization, AG Computer Assisted Surgery
Lecturer(s):	Jun.-Prof. Dr. Christian Hansen, Prof. Dr.-Ing. habil. Bernhard Preim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise; Seminar
Workload:	Attendance times: lecture: 2 semester hours per week tutorial/seminar: 2 semester hours per week Independent work: Reworking of the lecture Working on the seminar exercises Exam preparation 180 h (2*28h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Interactive Systems lecture, User Interface Engineering lecture
Intended learning outcomes:	Understanding the nature and importance of future user interfaces and the challenges and problems associated with them Getting to know, analyzing and evaluating technologies, interaction techniques and methods for the development of advanced user interfacesAbility to select suitable technologies and interaction techniques in the field of three-dimensional and modern Post-WIMP user interfaces Ability to critically analyze scientific literature and knowledge of scientific publishing Ability to conduct own research on a postgraduate level in the field of advanced user interfaces

English courtesy translation.
The German version is legally binding

Contents:	Introduction to Post-WIMP and Reality-based User Interfaces3D-Interaction: Tasks, Devices, 3D-Widgets, 3D UIs Augmented Reality Interaction Pen-based Interaction Techniques and Sketching Multitouch: Technologies, Gestures, Applications Gestural Interaction: Tracking, Freehand Gestures Tangible Interaction Advanced Topics: Gaze-based Interaction, Organic Interfaces, Everywhere Interfaces
Type of examination:	Exam: Written exam 120 min.
Media:	Powerpoint, blackboard, video, software demonstrations
Literature:	Bowman, Kruijff, Laviola, Jr., Poupyrev: "3D User Interfaces: Theory and Practice", Addison-Wesley, 2004Müller-Tomfelde (Ed.): "Tabletops - Horizontal Interactive Displays", Springer, 2010 Saffer: "Designing Gestural Interfaces", O'Reilly Media, 2008 Shaer, Hornecker: "Tangible User Interfaces: Past, Present and Future Directions". In Foundations and Trends in Human-Computer Interaction, 3 (1), 2010 Further references during the lecture and on the current website of the module (http://isgwww.cs.uni-magdeburg.de/uise/Studium/WS2010/VorlesungTAI/)

English courtesy translation.
The German version is legally binding

Module title:	Topics in Algorithmics
Engl. module name:	Topics in Algorithmics
Module level, (optional):	
Abbreviation:	TinA
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Theoretical Computer Science / Algorithmic Geometry
Lecturer(s):	Professorship for Theoretical Computer Science / Algorithmic Geometry
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 3 SWS lecture + presentations 1 SWS exercise Independent work: Working on the exercises and following up on the lectures, preparing the presentation 180h = 4 SWS = 56h attendance time + 124h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of algorithms and data structures and asymptotic analysis.
Intended learning outcomes:	Learning objectives & acquired skills: Ability to find asymptotically efficient solutions to algorithmic problems using state-of-the-art methods
Contents:	Design and analysis of selected algorithms (varies from course to course)
Type of examination:	Examination prerequisite: see lecture Exam: oral

Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Trainingsmodul Schlüssel- und Methodenkompetenz (dual) (SPO bis 09/2023)
Engl. module name:	Training Module in Key Competencies (dual)
Module level, (optional):	
Abbreviation:	TM SMK
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Training module FIN: B.Sc. INF - Key and methodological skills - Training module FIN: B.Sc. INGINF - Key and methodological skills - Training module FIN: B.Sc. WIF - Key and methodological skills - Training module
Teaching method / weekly hours:	Event-specific
Workload:	90 hours. The distribution between attendance times and independent work is course-specific.
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Application and training of key and methodological skills. This may include: team and project work, oral presentation, report writing, Time and self-management, professional orientation, scientific work.
Contents:	This module is implemented through different courses. The contents are therefore course-specific.
Type of examination:	This module is implemented through various courses. Type of examination are course-specific and must be completed in cooperation with the practice partner. They will be announced at the beginning of the course. The module is not graded in the FIN degree programs
Media:	
Literature:	Event-specific

English courtesy translation.
The German version is legally binding

Module title:	Trainingsmodul Schlüssel- und Methodenkompetenz (SPO bis 09/2023)
Engl. module name:	Training Module in Key Competencies
Module level, (optional):	
Abbreviation:	TM SMK
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Training module FIN: B.Sc. INF - Key and methodological skills - Training module FIN: B.Sc. INGINF - Key and methodological skills - Training module FIN: B.Sc. WIF - Key and methodological skills - Training module
Teaching method / weekly hours:	Event-specific
Workload:	90 hours. The distribution between attendance times and independent work is course-specific
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Application and training of key and methodological skills. These can include Team and project workOral presentationWriting a reportTime and self-management Professional orientation Scientific work
Contents:	This module is implemented through different courses. The contents are therefore course-specific.
Type of examination:	This module is implemented through different courses. Type of examination are course-specific and will be announced at the beginning of the course. The module is not graded in the FIN degree programs.
Media:	
Literature:	Event-specific

English courtesy translation.
The German version is legally binding

Module title:	Transaction Processing
Engl. module name:	Transaction Processing
Module level, (optional):	
Abbreviation:	TP
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship of Practical Computer Science / Databases and Information Systems
Lecturer(s):	Prof. Dr. Thomas Leich
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: weekly lectures 2 SWS weekly exercises 2 SWS Independent work: Exercises & exam preparation 180h (56h attendance time in lectures & exercises + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Databases" event
Intended learning outcomes:	Learning objectives & acquired skills: Basic understanding of the problems of transaction management Knowledge of theoretical principles Knowledge of algorithms and procedures for synchronization Knowledge of algorithms and procedures for maintaining ACID properties
Contents:	Transaction conceptSerializability theory Synchronization procedure

	Restoration and data backup Transaction management in distributed database systems (distributed synchronization, distributed commit, etc.) Extended transaction models
Type of examination:	Examination requirements: Registration and participation in the lectures and exercises Examination/ certificate: oral
Media:	
Literature:	Databases: Implementation Techniques. Gunter Saake, Kai-Uwe Sattler, Andreas Heuer, 3rd edition mitp-Verlag, Bonn, 2011, ISBN 978-3826691560

English courtesy translation.
The German version is legally binding

Module title:	Transport phenomena in granular, particulate and porous media
Engl. module name:	Transport phenomena in granular, particulate and porous media
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Prof. Tsotsas
Lecturer(s):	Prof. Tsotsas
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Professional specialization
Teaching method / weekly hours:	
Workload:	Attendance time: 42 hours / self-study: 48 hours
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Dispersed solids find broad industrial application as raw materials (e.g. coal), products (e.g. plastic granulates) or auxiliaries (e.g. catalyst pellets). Solids are in this way involved in numerous important processes, e.g. regenerative heat transfer, adsorption, chromatography, drying, heterogeneous catalysis. To the most frequent forms of the dispersed solids belong fixed, ag-itated and fluidized beds. In the lecture the transport phenomena, i.e. momentum, heat and mass transfer, in such systems are discussed. It is shown how physical fundamentals in combination with mathematical models and with intelligent laboratory experiments can be used for the design of processes and products, and for the dimensioning of the appropriate apparatuses. Master transport phenomena in granular, particulate and porous media Learn to design respective processes and products Learn to combine mathematical modeling with lab experiments
Contents:	Transport phenomena between single particles and a fluidFixed beds: Porosity, distribution of velocity, fluid-solid transport phenomena Influence of flow maldistribution and axial dispersion on heat and mass transfer Fluidized beds: Structure, expansion, fluid-solid transport phenomena Mechanisms of heat transfer through gas-filled gaps Thermal conductivity of fixed beds without flow

	Axial and lateral heat and mass transfer in fixed beds with fluid flow Heat transfer from heating surfaces to static or agitated bulk materials Contact drying in vacuum and in presence of inert gas Heat transfer between fluidized beds and immersed heating elements
Type of examination:	Exam: oral
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Umweltmanagementinformationssysteme
Engl. module name:	Umweltmanagementinformationssysteme
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. INF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture = 28h 2 SWS exercise = 28h Independent work: Lecture preparation and follow-up Development of solutions in the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Methods and Tools for Management Information Systems
Intended learning outcomes:	Learning objectives & skills to be acquired: Understanding the tension between environmental aspects, environmentally oriented performance and environmental information Application of methodological approaches for measuring environmental aspects and environmentally oriented performance Understanding the legal consequences of poor environmental performance Application of methodical approaches for the efficient collection, management and use of metadata and environmental management data Application of a methodical approach to the introduction of environmental management information systems in organizations

Contents:	Fundamentals of environmental management systemsLegal and other environmental protection requirements Methods, tools and standards for environmental management systems Design and introduction of environmental management information systems
Type of examination:	Processing the exercises Oral examination
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Usability und Ästhetik
Engl. module name:	Usability and Aesthetic
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Professorship of Applied Computer Science / Business Informatics - Management Information Systems
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Design WPF WLO BSc from 5th semester (module 4 CP), WPF WMB BSc from 5th semester (module 4 CP)
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: - 2 SWS Lecture - 2 SWS Exercise Independent work: - Lecture preparation and follow-up - Development of solutions in and for the exercise 150h = 4 SWS = 56h attendance time + 94h independent work
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Understanding of the aesthetics and design of information and communication systems or information and communication technology Understanding design as the key to the sustainable and contemporary implementation of information and communication systems or information and communication technology Application of a methodical approach for the development of a sustainable design strategy Application of usability, user experience and good design for information and communication systems or information and communication technology

Contents:	Methods of user experience design and design thinking for the ideation phase in the development process of products and services - Design history of information and communication products - Methods for designing and implementing a usability and user experience - 10 theses of good design - Good design for information and communication systems or information and communication technology
Type of examination:	Successful completion of the semester assignment enables students to take the examination. Examination: written examination (written exam) in the summer semester
Media:	
Literature:	See http://bauhaus.cs.uni-magdeburg.de

English courtesy translation.
The German version is legally binding

Module title:	Verfahrenstechnische Projektarbeit
Engl. module name:	Verfahrenstechnische Projektarbeit
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Thermodynamics and Combustion
Lecturer(s):	Dr.-Ing. Hermann Woche, Prof. Dr.-Ing. Eckehard Specht
Language:	German
Assignment to the curriculum:	FIN: B.Sc. INGINF - Engineering specializations - Process Engineering
Teaching method / weekly hours:	Internship; Seminar
Workload:	Attendance time: 28 hours, self-study: 32 hours
Credit points / ECTS:	2
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Learning to work in groups and independently develop process engineering projects
Contents:	A possible process technology must be developed for the manufacture of a given product. The product behavior must be investigated on a laboratory system.
Type of examination:	Presentation
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Virtuelle Inbetriebnahme
Engl. module name:	Virtuelle Inbetriebnahme
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr. Christian Diedrich, FEIT-IFAT
Lecturer(s):	Prof. Dr. Christian Diedrich, FEIT-IFAT
Language:	German
Assignment to the curriculum:	FIN: M.Sc. DIGIENG - Methods of Digital Engineering
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Present tense: Lectures 2 SWS; Exercises 1 SWS Independent work: Reviewing the lecture; solving the exercises Exam preparation 120 h (42 h attendance time + 78 h independent work)
Credit points / ECTS:	5
Mandatory prerequisites :	Basic knowledge of computer science and software development
Recommended prerequisites:	
Intended learning outcomes:	Classification of machine and system simulation with a focus on virtual and hybrid commissioning in the digital planning and operating life cycle phases Automation-related aspects of virtual commissioning Model basis for the components used in virtual commissioning Communicating the integration technologies in the PLM
Contents:	In the early planning and production phase, simulation tools are used in the engineering of technical systems to validate and safeguard the design, to test the control software and for user training purposes. System components that do not actually exist are simulated and are therefore referred to as virtual components. This enables a step-by-step procedure from the completely virtual to the complete real and functional technical system (hybrid commissioning). The simulation takes place in an interdisciplinary environment between mechanical, electrical and automation engineering.
Type of examination:	

	Participation in the courses Examination at the end of the module, grading scale according to examination regulations, Points awarded after written exam or oral exam
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Visual Analytics
Engl. module name:	Visual Analytics
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Professorship for Applied Computer Science / Visualization
Lecturer(s):	Prof. Dr.-Ing. Bernhard Preim
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS weekly lecture, 2 SWS weekly exercise Independent work: Reworking the lecture, working on the exercises, exam preparation, written work for Master students 150 h (2*28h attendance time + 94h independent work), plus 1 CP (Master) for written work
Credit points / ECTS:	Master: 6
Mandatory prerequisites :	
Recommended prerequisites:	Visualization, prior knowledge of data analysis, e.g. intelligent data analysis, data mining, machine learning, artificial intelligence
Intended learning outcomes:	Learning objectives and skills to be acquired: This lecture teaches how large, high-dimensional, partially unreliable and incomplete data can be analyzed using data analysis techniques and interactive visualizations that are tightly coupled. The properties and parameters of important data analysis methods are explained and it is shown how these methods can be integrated into visual analytics systems. The interdisciplinary nature of the development and use of visual analytics approaches is emphasized. This also includes questions of visual perception and the cognitive processing of visual data

	and their role in decision-making processes. Particular attention will be paid to the knowledge creation process; the process by which observations, hypotheses, statistical results and other artifacts are generated and managed. Examples of applications range from financial data (share prices), credit card transaction data, gene expression data to epidemiological data and patient data. Target groups of such applications are investors, security departments, biologists, statisticians and doctors.
Contents:	Introduction: Potential and areas of application of visual analyticsVisual analytics based on clustering Visual analytics based on subspace clustering and bi-clustering Visual Analytics with Decision Trees Visual analytics with association rules Scatterplot-based visualizations Visual analytics from events sequences Interactive and cooperative methods of visual analytics Visual analytics in the healthcare sector
Type of examination:	Examination prerequisites: Will be announced at the beginning of the semester. Exam: Written exam (120 min.)
Media:	Powerpoint presentation, use of blackboard, videos
Literature:	J. J. Thomas, K. A. Cook (eds.): Illuminating the path: The research and development agenda for visual analytics. IEEE Computer Society 2005D. A. Keim, F. Mansmann, J. Schneidewind, J. Thomas, H. Ziegler: Visual analytics: Scope and challenges. Visual Data Mining, 2008

English courtesy translation.
The German version is legally binding

Module title:	Visual Analytics in Health Care
Engl. module name:	Visual Analytics in Health Care
Module level, (optional):	
Abbreviation:	VAHC
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr.-Ing. Bernhard Preim Dr. Gabriel Mistelbauer
Lecturer(s):	Prof. Dr.-Ing. Bernhard Preim Dr. Gabriel Mistelbauer
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Applications / Humanities Basics FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Seminar
Workload:	3 credit points = 90 h (28 h attendance time + 62 h independent work), grading scale according to examination regulations
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	Visualization, Data Mining, Visual Analytics or Information Visualization
Intended learning outcomes:	Learning objectives and competences to be acquired: This seminar teaches how combinations of data analysis (clustering, regression analysis, classification rules) can be combined with methods of interactive visualization, e.g. heat maps, scatterplots and time-based visualizations to solve problems in healthcare. The applications concern clinical medicine (decision support for physicians based on electronic health records), medical research, e.g. the recognition of undesirable drug effects, the area of public health, which is concerned, for example, with defining an adequate data-based reaction to a strong outbreak of an infectious disease, and epidemiology, which examines risk factors for the development of diseases on the basis of observation and cohort studies and thus develops approaches for the prevention of diseases. All the topics covered are based on real data. The presentations are also intended to raise awareness of the fact that data quality is never perfect; missing and partially unreliable or at least inaccurate data are the basis of the analytical evaluation.

Contents:	- Overview: Potential and applications of Visual Analytics in Healthcare - Visual Analytics in Public Health - Visual Analytics in Clinical Medicine - Visual Analytics for Detecting Adverse Drug Effects - Visual Analytics in Epidemiology
Type of examination:	Examinations: student talk, seminar paper (10 pages)
Media:	PowerPoint presentation, use of whiteboard, videos
Literature:	Workshop volumes of the IEEE Workshop Visual Analytics in Healthcare (since 2010), selected publications of other conferences / magazines in the fields of data analysis and visualization

English courtesy translation.
The German version is legally binding

Module title:	Visualization
Engl. module name:	Visualization
Module level, (optional):	
Abbreviation:	VIS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester; M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Visualization
Lecturer(s):	Prof. Dr. Bernhard Preim
Language:	English
Assignment to the curriculum:	FIN: B.Sc. CV - Compulsory subjects FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - WPF Design & Application FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Fundamentals area FIN: M.Sc. VC - Visual Computing - Compulsory subjects FIN: M.Sc. VC - Visual Computing - Electives
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Presence: - 2 SWS Lecture - 2 SWS Exercise Individual work: Work on the exercises and follow-up of the lectures, exam preparation
Credit points / ECTS:	Bachelor: 5 credit points = 150h = 4 SWS = 56h attendance time + 94h independent work Master: 6 Credit Points = 180h = 4 SWS = 56h attendance time + 124h independent work Grading scheme according to exam regulations
Mandatory prerequisites :	none
Recommended prerequisites:	Knowledge from the modules: Computergraphics I, Mathematics I, II, III
Intended learning outcomes:	Goals: This lecture conveys basic knowledge about visualizing large data in a structured manner including interactive exploration of the data by means of visual interfaces. Objectives:

	Awareness of visualization goals, selection and assessment of visualization techniques Application of basic principles of computer-assisted visualization Adaptation of visualization algorithms for solving application problems Evaluation of visualization techniques in terms of performance, scaleability
Contents:	Visualization goals and quality criteriaUnderstanding of fundamentals of visual perceptionOverview about data structures in visualizationBasic algorithms (Isolines, color scales, diagramm techniques),Direct and indirecte visualization of volume dataInformation visualization
Type of examination:	Prerequisites: see lecture Exam: written examination 120 min.
Media:	Powerpoint presentation, sketches, videos
Literature:	P. and M. Keller (1994): Visual Cues, IEEE Computer Society PressT. Munzner (2015). Visualization Analysis and Design: Principles, Techniques, and Practice, A K PetersW. Schroeder, K. Martin, B. Lorensen (2001): The Visualization Toolkit: An object-oriented approach to 3d graphics, 3rd ed. Springer, HeidelbergA. Telea (2014): Data Visualization: Principles and Practice, Second Edition, AK Peters (2nd edition)M. Ward, D. Keim, G. Grinstein (2015): Interactive Data Visualization: Foundations, Techniques, and Applications, Second Edition

English courtesy translation.
The German version is legally binding

Module title:	Visuelle Analyse und Strömungen in medizinischen Daten
Engl. module name:	Visual Analysis and Flow in Medical Data
Module level, (optional):	
Abbreviation:	VASMed
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 4th semester
Term:	Summer semester
Module coordinator:	Dr.-Ing. Sylvia Saalfeld (FIN-ISG)
Lecturer(s):	Dr.-Ing. Sylvia Saalfeld (FIN-ISG) Dr.-Ing. Philipp Berg (FVST-ISUT)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Visualistics FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INGINF - WPF Computer Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 4 SWS application-oriented lecture Independent work: Reviewing the lectures and the application examples presented, exam preparation or project work (with a small number of participants) 180h (56h attendance time + 124h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	The course is divided into two medically relevant subject areas. In the first part, the fundamentals of fluid mechanics are taught in an application-oriented manner. In this context, basic principles of classical fluid mechanics are transferred to medical issues, with a focus on blood flow descriptions. Furthermore, an introduction to computational fluid dynamics (CFD) is given, which allows various flow phenomena to be simulated. Both the opportunities and limitations of the approaches used are discussed. The second part of the course relates to the visual analysis of medical data sets, e.g. computer tomography (CT) or magnetic resonance imaging (MRI) data. 3D visualizations of the data sets improve the diagnosis of certain clinical pictures, such as cardiovascular diseases or cancer, enable therapy planning of complex interventions and allow interactive exploration of the patient's individual anatomy. The course teaches the basics of computer graphics and visualization, as well as the necessary image processing and analysis steps. Complex visualization techniques for medical applications are then presented.

Contents:	Part 1: Medical currents: Teaching the basics of fluid mechanics Application to medically relevant flow phenomena (e.g. cardiovascular system, cerebral hemodynamics, pulmonary and pharyngeal flows) Introduction to Computational Fluid Dynamics Identification of opportunities and limitations of simulation techniques for medical flows Part 2: Visual analysis of medical data Introduction to visualization and image analysis for medical data sets Direct volume visualization using transfer functions Indirect volume visualization using surfaces Visual analysis of medically relevant diseases (e.g. cardiovascular diseases, tumor diseases)
Type of examination:	Oral examination or project presentation (with a small number of participants)
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	Visuelle Kommunikation für Digitale Medien
Engl. module name:	Visual Communication for Digital Media
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 2nd semester
Term:	every semester
Module coordinator:	Prof. Steffi Hußlein
Lecturer(s):	Prof. Steffi Hußlein, Mareike Gabele (M.A.)
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - General Visualistics - Design
Teaching method / weekly hours:	Seminar
Workload:	5 CP = 150 hrs. (30 hours attendance + 60 hours independent familiarization and practice + 30 hours preparation of a presentation + 30 hours preparation of a handout in own layout)
Credit points / ECTS:	5 CP
Mandatory prerequisites :	none
Recommended prerequisites:	
Intended learning outcomes:	The increasing complexity and diversity of digital media makes it necessary to be confident in the field of digital design. The necessary skills are systematically acquired through a series of lectures in the field of visual communication with a focus on the design of digital media. In addition, application-oriented tasks are published for each lecture to reinforce what has been learned. The teaching of design and conceptual principles for digital systems is intended to consolidate the ability to make decisions on design issues in interaction design and to develop independent competence and stylistic confidence in design. Theoretical and practical basics of visual communication in the screen design of electronic media (e.g. Internet/World Wide Web, tablets, smartphones, e-books, digital television, media facades, digital video, etc.) are taught as well as methods for handling and designing information and operating structures in digital, dynamic applications.
Contents:	Visual communication goes beyond the interface as a styling surface. Challenges include comprehensibility and adaptation to the target group. In the course "Visual Communication for Digital Media I UI Design", ideas, concepts, visualizations and prototypical implementations of a tablet app are developed step by step and in a practice-oriented manner. Among other things,

	flowcharts and wireframes are created for this purpose. The focus of a final video prototype is on a target group-oriented, coherent concept and interaction as well as a suitable formal-aesthetic implementation of layout and micro-animations. The course consists of the following theoretical and practical content modules: Development of visual communication: from analog media to digital media Basics of visual communication Gestalt laws Perceptual physiology and psychology Readability of text in digital media Digital color and color mixing Screen grid and image organization Orientation and navigation in digital information spaces Preparation and creation of digital, dynamic data and information visualizations In addition to the principles of design, feedback, continuity, consistency and plausibility, the importance of mental models and metaphors as well as the organization and navigation of and in information sets is dealt with. This grammar covers the topics: Organization and perception of surface and space, color, movement/speed, layout, semantic structuring of text and images, scalability of grids and typography.
Type of examination:	Draft + presentation + handout
Media:	
Literature:	

Module title:	VLBA – Cloud DevOps Technologies
Engl. module name:	VLBA - Cloud DevOps Technologies
Module level, (optional):	
Abbreviation:	VLBA-CDOT
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Klaus Turowski
Lecturer(s):	Prof. Dr. Klaus Turowski
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Computer Science Basics for Engineers FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Data Processing for Data Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time = 42 h: - 21 h Lecture - 21 h Exercise Independent work = 138 h: - 138 h Working on several assignments that build on each other
Credit points / ECTS:	6 credit points = 6*30 h = 180 h (42 h attendance time + 138 h independent work) Grading scale according to examination regulations
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Creating an overview of relevant tools and technologies for the development of cloud-based systems and providing initial experience in their use.
Contents:	In view of highly networked applications, big data and cloud computing, the careful planning and construction of architectures and landscapes of the corresponding information systems is more important than ever. In many cases, the lifecycle of a system does not end with the delivery of the solution, but rather the subsequent operation, monitoring and maintenance have become an essential part of this process. At this point, sophisticated paradigms and methods are required to facilitate the continuous development and operation of these

	systems while preventing errors, failures and other disruptions. The course is designed to provide the fundamentals as well as initial hands-on experience in the development and operations, or DevOps, of systems in conjunction with dedicated cloud technologies. In addition to the theoretical basics, essential concepts and technologies are discussed and applied that enable the continuous integration, delivery and testing of corresponding systems.
Type of examination:	Term paper
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	VLBA 1: Systemarchitekturen
Engl. module name:	VLBA 1: Systemarchitekturen
Module level, (optional):	
Abbreviation:	VLBA1
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Professorship for Applied Computer Science / Business Informatics
Lecturer(s):	Professorship for Applied Computer Science / Business Informatics
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Professional specialization FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Business Information Systems
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 28 h lecture / 28 h exercise Independent work: 54 h Preparation and follow-up lecture 70 h Development of an information system in the exercise 6 x30h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & skills to be acquired: Learning techniques and methods of component-based system development Methods for building complex interorganizational business information systems based on service-oriented architecture Acquisition of practical skills for the development of complex distributed information systems
Contents:	Theory of component-based system developmentSpecialist components, frameworks, component lifecycles,CoBCoM architectureArchitectures of system landscapes Pattern languages and architecture patterns Service-oriented architecture (SoA)

	Web services Mediators Case studies Personal Information GuideShared ERP ArchitecturePrototype realization of an interorganizational information system based on the CoBCoM architecture and SoA
Type of examination:	Participation in a development project, oral examination
Media:	
Literature:	Turowski, K.: Specialized components. Aachen 2002. Herden, S., Marx Gómez, J., Rautenstrauch, C., Zwanziger, A.: Softwarearchitekturen für E-Business-Systeme, Berlin, Heidelberg u. a., 2006.

English courtesy translation.
The German version is legally binding

Module title:	VR und AR in industriellen Anwendungen
Engl. module name:	VR und AR in industriellen Anwendungen
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Professorship for Logistic Systems
Lecturer(s):	Professorship for Logistic Systems
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture; exercise; practical course
Workload:	Lecture and lecture-accompanying exercise including a programming practical with the VDT platform of the Fraunhofer IFF, independent work on the exercises as a prerequisite for admission to the examination Attendance times Weekly lectures 2 SWS Weekly exercises 2 SWS Independent work, working on exercises, follow-up of lectures, exam preparation 180 h (56 h attendance time + 124 h independent work)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Basic knowledge of computer graphics
Intended learning outcomes:	Learning objectives & skills to be acquired The lecture uses practical examples to convey the Creation of VR and AR applications in an industrial environment. The lecture includes preparatory measures for data preparation, such as transferring data from CAD systems and texture extraction. In the practical programming course, the authoring system of the VDT platform of the Fraunhofer IFF is used and own program extensions of the VDT platform are implemented.
Contents:	Overview of possible uses of VR applications in different industriesOverview of standard VR/AR hardware/software on the market Creation of simple VR models with a 3D modeling system Data transfer from commercial CAD systems

	Creation of scenarios with the authoring system of the Fraunhofer IFF's VDT platform Creating your own VR applications using the OpenSG graphics library and the VDT platform as examples Creation of AR applications with an AR toolkit
Type of examination:	Will be announced at the beginning of the event. Examination or proof of performance
Media:	
Literature:	

English courtesy translation.
The German version is legally binding

Module title:	VR/AR-Technologien für die Produktion
Engl. module name:	VR/AR-Technologien für die Produktion
Module level, (optional):	
Abbreviation:	
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	FMB-ILM, Prof. Schenk, Steffen Masik
Lecturer(s):	Hon. Prof. Schreiber, Dr. Schumann, FMB-ILM
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Applications / Humanities Basics
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance time: Lectures: 2 SWS, Exercises: 1 SWS Independent work: Preparation and follow-up of the exercises (42 h attendance time and 108 h self-study) M.Sc. CV: 6 CP with additional achievement: seminar presentation
Credit points / ECTS:	5 Master CV: 6
Mandatory prerequisites :	Fundamentals of manufacturing theory Basics of construction technology
Recommended prerequisites:	
Intended learning outcomes:	Getting to know virtual reality (VR) and augmented reality (AR) as new forms of human-machine interaction for designing production systems and processes.
Contents:	Application scenarios using the example of the production life cycle; overview of VR/AR hardware/software components VR/AR systems VR-based experimentation platforms for planning, testing and operating production technology
Type of examination:	Exam: Written exam K90
Media:	
Literature:	Script: Schreiber, W.; Zimmermann, P.,(Eds.): Virtual techniques in the industrial environment

English courtesy translation.
The German version is legally binding

Module title:	Wahlpflichtfach FIN Schlüssel- und Methodenkompetenz
Engl. module name:	Elective Course in Method and Key Competencies
Module level, (optional):	
Abbreviation:	WPF FIN-SMK
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 6th semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	Event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - FIN SMK FIN: B.Sc. INF - Key and methodological skills - FIN SMK FIN: B.Sc. INGINF - Key and methodological skills - FIN SMK FIN: B.Sc. WIF - WPF Design & Application - FIN SMK
Teaching method / weekly hours:	Event-specific
Workload:	Event-specific
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills Advanced methodological skills in the field of computer science and its applications and/or advanced personal or social skills on the basis of a specialized course at OVGU. This module can be implemented through different courses. The subject-specific learning objectives are course-specific.
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of examination:	This module is implemented through different courses. Type of examination are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	Event-specific

English courtesy translation.
The German version is legally binding

Module title:	Werkzeuge für das wissenschaftliche Arbeiten
Engl. module name:	Tools for Scientific Work
Module level, (optional):	
Abbreviation:	WWA
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Prof. Dr. Michael Kuhn
Lecturer(s):	Prof. Dr. Michael Kuhn
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Training module FIN: B.Sc. INF - Key and methodological skills - Training module FIN: B.Sc. INGINF - Key and methodological skills - Training module FIN: B.Sc. WIF - Key and methodological skills - Training module
Teaching method / weekly hours:	Internship
Workload:	Attendance: 3 SWS (42h) Independent work: Follow-up of the presented contents, further work with the tools (48h)
Credit points / ECTS:	3 CP
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Participants learn how to use the tools presented and how to work effectively with them.
Contents:	Nowadays, a variety of tools are used for scientific work that can make scientists' work easier. However, it is necessary to know the strengths and weaknesses of the respective tools and to be familiar with how they work. In the training module, we will deal with the most important tools for scientific work. These include using the command line, version management with Git, developing scripts for automation, plotting results and working with LaTeX for writing publications, reports and presentations. The course is designed to be very practical. The tools can and should be tried out live by the participants.
Type of examination:	Active and successful participation in the attendance part
Media:	
Literature:	

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Module title:	Wissenschaftliches Individualprojekt
Engl. module name:	Wissenschaftliches Individualprojekt
Module level, (optional):	
Abbreviation:	WIP
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	every semester
Module coordinator:	Professorship for Simulation
Lecturer(s):	Offered by various university lecturers at FIN
Language:	German
Assignment to the curriculum:	for the Master's degree programs
Teaching method / weekly hours:	Guided individual scientific project
Workload:	180 hours of self-study and project work
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Offer-specific
Intended learning outcomes:	Learning objective: In this module, students acquire specialist knowledge in a sub-area of computer science through guided scientific work. This is done by studying specialist literature and through original scientific work. Acquired competencies: Independent and guided scientific work, e.g: Familiarization with a scient. Presentation of the current state of knowledge on the basis of a literature researchRecognition of problems or gaps in knowledgeProposal for closing the gapImplementation of a proposed solutionPlanning, execution and interpretation of experimentsWriting a paperHolding a presentationThe subject-specific learning outcomes are offer-specific.
Contents:	Offer-specific
Type of examination:	Scientific presentation and elaboration
Media:	
Literature:	Offer-specific

Module title:	Wissenschaftliches Rechnen IV: Tensoren, Differentialformen und Vektoranalysis
Engl. module name:	Scientific Computing IV: tensors, differential forms, and vector calculus
Module level, (optional):	
Abbreviation:	WRIV
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 1st semester; M.Sc. from 1st semester
Term:	Summer semester
Module coordinator:	Junior Professorship Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessing
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DKE - Fundamentals of Data Science FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Lecture
Workload:	Attendance times: 2 SWS lecture / 2 SWS exercise Independent work: Reviewing the lecture Solving the exercises 180 h (56 h attendance time + 124 h independent work) Grading scale according to examination regulations
Credit points / ECTS:	6 CP
Mandatory prerequisites :	
Recommended prerequisites:	Sound knowledge of linear algebra
Intended learning outcomes:	Basic knowledge of tensors and differential forms and their classical formulation as vector analysis, so that they can be used in applications of computer graphics, natural and engineering sciences, e.g. for numerical simulation of fluids or Maxwell's equations.
Contents:	Tensors and multi-linear algebra Differential forms, de Rahm complex, outer derivative, Lie derivative, Hodge dual Formulation of vector analysis with differential forms If necessary, extension of the concepts to manifolds
Type of examination:	Oral examination
Media:	Blackboard, slides, sample programs
Literature:	J. E. Marsden, T. S. Ratiu, and R. Abraham, Manifolds, Tensor Analysis, and Applications, Springer-Verlag, 2004.

	T. Frankel, The Geometry of Physics, Third. Cambridge University Press, 2011. I. Agricola and T. Friedrich, Vector Analysis: Differential Forms in Analysis, Geometry and Physics. Vieweg+Teubner Publishers, 2010.

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The German version is legally binding

Module title:	Wissenschaftliches Rechnen V: Strukturerhaltende Simulationen und Geometrische Mechanik
Engl. module name:	Scientific Computing V: Structure Preserving Simulations and Geometric Mechanics
Module level, (optional):	
Abbreviation:	WR V
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	Winter semester
Module coordinator:	Junior Professorship for Real-Time Computer Graphics
Lecturer(s):	Junior Professor Dr. Christian Lessig
Language:	English
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Digital Engineering FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. VC - Visual Computing - Electives
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture / 2 SWS exercise Independent work: Reworking the lecture Solving the exercises
Credit points / ECTS:	6 credit points = 180 h (56h attendance time + 124h independent work) work) Grading scale according to examination regulations
Mandatory prerequisites :	none
Recommended prerequisites:	Strongly recommended: Scientific Computing IV; Recommended: Scientific Computing II
Intended learning outcomes:	The course provides an introduction to structure preserving numerical simulations that respect the invariants of physical systems, for example conserve energy or momentum. It also provides the necessary background from geometric mechanics.
Contents:	- Variational and Hamiltonian formulation of mechanical systems - Variational structure preserving integrators - Symplectic integrators - Mechanical systems with symmetry, reduction and numerical integrators for these systems

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Type of examination:	Oral examination
Media:	Blackboard, slides, sample programs
Literature:	J. E. Marsden and T. S. Ratiu. Introduction to Mechanics and Symmetry: A Basic Exposition of Classical Mechanical Systems. Texts in Applied Mathematics. Springer-Verlag, New York, third ed. edition, 1999. J. E. Marsden and M. West. Discrete Mechanics and Variational Integrators. Acta Numerica, 10:357-515, 2001. E. Hairer, C. Lubich, and G. Wanner. Geometric Numerical Integration. Springer Series in Computational Mathematics. Springer-Verlag, second ed. edition, 2006

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Module title:	Wissenschaftliches Seminar
Engl. module name:	Scientific Seminar
Module level, (optional):	
Abbreviation:	WissSem
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar
Teaching method / weekly hours:	
Workload:	Attendance times = 28 h SWS Seminar Independent work = 62 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic This module is implemented through various courses. The subject-specific teaching objectives are course-specific.
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of examination:	This module is implemented through different courses. Type of examination are course-specific and will be announced at the beginning of the course.
Media:	
Literature:	event-specific

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Module title:	Wissenschaftliches Seminar (dual)
Engl. module name:	Scientific Seminar (dual)
Module level, (optional):	
Abbreviation:	WissSem
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 5th semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	event-specific
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - Key and methodological skills - Scientific seminar FIN: B.Sc. INF - Key and methodological skills - Scientific seminar FIN: B.Sc. INGINF - Key and methodological skills - Scientific seminar FIN: B.Sc. WIF - Key and methodological skills - Scientific seminar
Teaching method / weekly hours:	Lecture
Workload:	Attendance times = 28 h SWS Seminar Independent work = 62 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points / ECTS:	3
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Independent development of a challenging topic Oral presentation of a challenging topic Written documentation of a challenging topic This module is implemented through various courses. The subject-specific teaching objectives are offer-specific
Contents:	This module can be implemented through different courses. The subject-specific content is offer-specific.
Type of examination:	This module is implemented through various courses. Type of examination are course-specific and must be completed in cooperation with the practice partner. They will be announced at the beginning of the course.
Media:	

Literature:	event-specific

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Module title:	Wissenschaftliches Team-Projekt
Engl. module name:	Wissenschaftliches Team-Projekt
Module level, (optional):	
Abbreviation:	WTP
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	every semester
Module coordinator:	Lecturers at FIN
Lecturer(s):	Offered by various university lecturers at FIN.
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV - Key and methodological skills FIN: M.Sc. DIGIENG FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Models department FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Key and methodological skills FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. INGINF - Engineering Informatics FIN: M.Sc. INGINF - Engineering Sciences FIN: M.Sc. INGINF - Key and methodological skills FIN: M.Sc. VC - Key and methodological skills FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems FIN: M.Sc. WIF - Business and Economics FIN: M.Sc. WIF - Key and methodological skills
Teaching method / weekly hours:	Project
Workload:	Supervised project work, teamwork, self-study, presentations 180h (distribution course-specific)
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Advanced methodological skills in the field of computer science and its applications Advanced personal and social skills Working in a team Preparation and realization of scientific presentations Independent and guided scientific work Implementation and evaluation of scientific ideas

	This module is implemented by different university lecturers. The subject-specific teaching objectives are therefore offer-specific
Contents:	This module is implemented by different university lecturers. The subject-specific content is therefore offer-specific.
Type of examination:	event-specific
Media:	
Literature:	

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Module title:	Wissenschaftliches Teamprojekt KMD
Engl. module name:	Team project KMD
Module level, (optional):	
Abbreviation:	TeamprojKMD
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	---
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. DIGIENG - Methods of Computer Science FIN: M.Sc. DKE - Applied Data Science FIN: M.Sc. DKE (old) - Area Methods I FIN: M.Sc. DKE (old) - Methods II area FIN: M.Sc. DKE (old) - Applications area FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science FIN: M.Sc. WIF - Business Information Systems Can be credited accordingly as an implementation of the generic module "Scientific Team Project".
Teaching method / weekly hours:	Scientific team project
Workload:	Attendance times (incl. consultation appointments) and independent work (individually and in a team) according to "credit points" 180h = 28h attendance time +152h independent work Independent processing of a challenging scientific topic in group work Attendance time (incl. consultation appointments) for supervision and discussion of the topic, monitoring of progress during processing Team coordination Preparation of a presentation Preparation of the term paper, which also includes the content of the presentation
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	Data Mining
Intended learning outcomes:	Learning objectives & acquired skills:

	1. general objectives and competencies: see module description of the faculty-wide module "Scientific Team Project" and 2. subject-specific goals and competencies: Acquisition of knowledge on selected topics of "Knowledge Management & Discovery" (examples of sub-areas under "Content") Familiarization with a challenging scientific sub-area of "Knowledge Management & Discovery" Development of a solution to a real or realistic (simplified) task in the field of "Knowledge Management & Discovery"
Contents:	Advanced tasks from the research area "Knowledge Management & Discovery", including topics from the sub-areas: Stream Mining (Stream) Recommenders Medical Mining Opinion (stream) mining Active & semi-supervised (stream) learning
Type of examination:	Examination: Term paper
Media:	
Literature:	Subject-dependent, provided for each team at the start of the project

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Module title:	Wissenschaftliches Teamprojekt Managementinformationssysteme
Engl. module name:	Scientific Team Project Management Information Systems
Module level, (optional):	
Abbreviation:	WTPMIS
Subtitles (optional):	
Courses, (optional):	
Semster:	M.Sc. from 1st semester
Term:	
Module coordinator:	Prof. Dr. Hans-Knud Arndt
Lecturer(s):	Prof. Dr. Hans-Knud Arndt
Language:	German
Assignment to the curriculum:	FIN: M.Sc. CV - Computer Science FIN: M.Sc. CV - Computer Visualistics FIN: M.Sc. DIGIENG - Human Factors FIN: M.Sc. INF - Computer Science FIN: M.Sc. INGINF - Computer Science FIN: M.Sc. WIF - Computer Science
Teaching method / weekly hours:	Exercise; Seminar
Workload:	Attendance times = 56 h 2 SWS Seminar 2 SWS Exercise Independent work = 124 h Working through the topic Preparation of a presentation Written elaboration of the topic
Credit points / ECTS:	6
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Learning objectives & acquired skills: Advanced methodological skills in the field of computer science and its applications Advanced personal and social skills Working in a team Preparation and realization of scientific presentations Independent and guided scientific work Implementation and evaluation of scientific ideas
Contents:	Selected topics on management information systems
Type of examination:	Examination prerequisite: - Examination: term paper (seminar paper)

Media:	
Literature:	Website: http://bauhaus.cs.uni-magdeburg.de

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Module title:	Wissensmanagement – Methoden und Werkzeuge
Engl. module name:	Knowledge Management - Methods and Tools
Module level, (optional):	
Abbreviation:	WMS
Subtitles (optional):	
Courses, (optional):	
Semster:	B.Sc. from 3rd semester
Term:	Winter semester
Module coordinator:	Chair of Applied Computer Science / Business Informatics II (KMD working group)
Lecturer(s):	Prof. Myra Spiliopoulou
Language:	German
Assignment to the curriculum:	FIN: B.Sc. CV - WPF Computer Science FIN: B.Sc. INF - WPF Computer Science FIN: B.Sc. INF - Study profile - Learning Systems / Biocomputing FIN: B.Sc. INGINF - WPF Computer Science FIN: B.Sc. WIF - Design FIN: M.Sc. DKE - Applied Data Science For release and assignment to curricula of interdisciplinary degree programs and degree programs outside the FIN, see study documents of the respective degree program.
Teaching method / weekly hours:	Lecture; Exercise
Workload:	Attendance times: 2 SWS lecture + 2 SWS exercise Independent work: Preparation and follow-up of the lecture Development of solutions for the exercises Preparation for the final exam 150 h = 4 SWS=56h attendance time+94h independent work Master's degree programs: 6 CP -- achieved through an additional task announced in the exercise at the beginning of the semester
Credit points / ECTS:	5
Mandatory prerequisites :	
Recommended prerequisites:	
Intended learning outcomes:	Gain insight into the field of knowledge management, including:Understand the role of knowledge management and WMS in the organizationAcquire knowledge of relevant technologies, with a focus on text miningAcquire knowledge of the functionalities of knowledge management solutions using examples
Contents:	

	Knowledge management in the company: Terms and frameworks for knowledge management solutionsKnowledge and strategy/decision supportKnowledge management methods for explicit and tacit knowledge, including document management and text miningCase studies
Type of examination:	Advance payments: Successful completion of the exercises Presentations of results Modalities will be given at the beginning of the event. Examination: written (written exam)
Media:	
Literature:	Literature for Part I of the course: 1. Franz Lehner 'WISSENSMANAGEMENT - Basics, methods and technical support' 6th revised and extended edition, 2021, Publisher: HANSER; available at www.hanser-elibrary.com from our university library 2. case studies additionally from: - K. Mertins & H. Seidel. "Knowledge management in SMEs", SPRINGER (2009) - A. Stocker & K. Tochtermann, "Knowledge transfer with wikis and weblogs: Case studies on the successful use of Web 2.0 in companies", GABLER (2010) Literature for part II of the course: 1. introductory help for classification from the corresponding chapter of the book 'Introduction to Data Mining', 2nd edition, (2018/2019) by Pan-Ning Tan, Michael Steinbach, Anuj Karpatne & Vipin Kumar, PEARSON (available at https://www-users.cs.umn.edu/~kumar001/dmbook/index.php) 2. excerpts on text mining from 'Modeling the Internet and the Web: Probabilistic Methods and Algorithms' (2003) by Pierre Baldi, Paolo Frasconi, Padhraic Smyth, WILEY 3. tutorial by Jesse Read on multi-label classification (linked from slide set) 2013 In addition, two introductory articles on text classification: 1) 'Text document preprocessing with the Bayes formula for classification using the Support Vector Machine' by Isa, D., Lee, L. H., Kallimani, V., and Rajkumar, R. IEEE Transactions on Knowledge and Data Engineering, 20(9):1264-1272, (2008), IEEE 2) 'Multinomial naive bayes for text categorization revisited' by Kibriya, A. M., Frank, E., Pfahringer, B., and Holmes, G. In Australasian Joint Conference on Artificial Intelligence, p. 488-499, (2004), SPRINGER Further reading on Part II:

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	Text as a raw material of knowledge: An Introduction to Text Mining', Chris Biemann, Gerhard Heyer, Uwe Quasthoff (2022), SPRINGER In Part II, we address topics that are covered in the book in Ӽ Section 3.2 'The linguistic pipeline': subsections 3.2.1-4 Ӽ Section 6.6 Classification, in particular Naive Bayes & Evaluation Ӽ Section 6.7 Creating training data appears. Further cited literature, additional case studies and scientific articles are listed at the beginning of the of the respective event block.