

Hochschule Karlsruhe

**Faculty for Computer Science and Business
Information Systems**

Module manual

**Course of studies Media and Communication
Computer Science (Bachelor), ER 2**

Winter semester 2024/2025

Module Media and Communication Computer Science (Bachelor), ER 2

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| Module Computer Science 1 | |
|---|--|
| Internal number | MKIB110 |
| Coordinator | Prof. Dr. Christian Pape |
| Scope | 8.0 ECTS points, 6.0 Contact hours |
| Placement | 1st Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | The courses of this module teach the students fundamental programming and algorithmic skills. The students should be enabled to analyze small problems, find solutions to these problems, and develop them in the Java programming language. |
| Exams | Individual exams |
| Lecture Computer Science 1 | |
| Internal number | MKIB111 |
| Lecturer | Prof. Dr. Christian Pape |
| Scope | 5.0 ECTS points, 4.0 Contact hours 150 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | After attending the lecture, the students are able to solve small computer science problems with the Java programming language. They know common design methods, basic search and sort procedures, and can apply them in practice. |
| Recommended reading | Selected exercises with solutions, slides in PDF format, Java programs and their documentation as Javadoc. Supplementary Java exercises with solutions to deepen the programming skills. |
| Exams | Written Exam 120 Min. (graded) |
| Comments | Lecture participation. Solving simple exercises in the lecture with teacher support. |
| Lecture Computer Science 1 Exercise | |
| Internal number | MKIB112 |
| Lecturer | Prof. Dr. Christian Pape |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |

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| Content | The students turn small computer sciences problems into practice (design, implementation with Java, testing, debugging). The students are able to create their own homepage. |
| Recommended reading | |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Practical assignment in a computer laboratory. |

| Module Media Design | |
|---|---|
| Internal number | MKIB120 |
| Coordinator | Prof. Thomas Hinz |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 1st Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | |
| Exams | Individual exams |
| Lecture Media Design | |
| Internal number | MKIB121 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The students become acquainted with the theoretical foundations of media design. This includes knowledge about creativity techniques, design rules and gestalt principles, systems of organisation, micro- and macro typography, colour theory, logos/pictograms/icons as well as grid systems for layouts. Additionally, they gain insights into analog and digital photography and the conception and design of digital media content exemplified through web applications. The students explore the history of design, starting at the dawn of industrialisation and including the seminal design movements of the 19th and 20th centuries as well as contemporary trends in design. This overview enables students to categorise and evaluate different design styles, allowing an integration of the acquired knowledge into their own design processes. |
| Recommended reading | <ul style="list-style-type: none"> - M. Jäger: "Grafik und Gestaltung: Mediengestaltung von A bis Z verständlich erklärt", Rheinwerk Verlag, 2014, ISBN 978-3-8362-2513-7 - S. M. Weinschenk: "100 Dinge, die jeder Designer über Menschen wissen muss", Addison-Wesley Verlag, 2011, ISBN 978-3827330994 - M. Pricken: "Kribbeln im Kopf", Schmidt Hermann Verlag, 2010, ISBN 978-3874397971 - T. Rempfen, Uwe Stoklossa: "Blicktricks", Schmidt Hermann Verlag, 2005, ISBN 978-3874396813 - C. Berents: "Kleine Geschichte des Design: Von Gottfried Semper bis Philippe Starck", C.H. Beck, 2011, ISBN 978-3406622410 |
| Exams | Written Exam 120 Min. (graded) |
| Comments | |
| Lecture Media Design Exercise | |

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|-------------------------|---|
| Internal number | MKIB122 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Exercise 1 Semester (not graded) |
| Comments | |

| Module Theoretical Computer Science | |
|---|--|
| Internal number | MKIB130 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 4.0 ECTS points, 4.0 Contact hours |
| Placement | 1st Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | Participants of this lecture will be in a position to recognize the fundamental limitations of today's computers when solving important problems. Hence, this course gives an introduction to the basic areas of modern theoretical computer science. The Chomsky hierarchy helps the students to classify formal languages by their algorithmic complexity. Furthermore, the students use computational models (finite state automata, push-down automata) to represent today's computers and to understand their limits. Due to these limitations, several problems are shown to be unsolvable. Proving all these results requires precise mathematical and logical arguments, and the students are intensively trained to use them correctly. |
| Exams | Individual exams |
| Lecture Theoretical Computer Science | |
| Internal number | MKIB131 |
| Lecturer | Prof. Dr. Heiko Körner |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course gives an introduction to the theory of formal languages. The Chomsky hierarchy will serve as a model to classify these languages by their computational complexity. Modern computers are represented by finite state automata, showing their principal limits. The students also learn how to apply several proof techniques. The lecture include the following areas of theoretical computer science: mathematical logic, formal languages, proof techniques, the O-calculus, finite automata, regular languages and expressions, the Chomsky hierarchy, the pumping lemma for regular and context-free languages and the minimization of finite automata by the theorem of Myhill-Nerode. Furthermore, the course covers pushdown automata, the CYK algorithm and closure properties of regular and context-free languages. |

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| Recommended reading | <p>The substance of the lecture will be discussed at the blackboard. Lecture notes containing the complete material are also available. Furthermore, there are sample solutions to all exercises.</p> <p>Literature: D. W. Hoffmann: Theoretische Informatik, 3. Auflage. Hanser, 2015. M. Sipser: Introduction to the Theory of Computation, 3rd edition. Cengage Learning, Inc., 2012.</p> |
| Exams | Written Exam 90 Min. (graded) |
| Comments | This course will take place as a pure lecture. Numerous exercises deepen selected areas and will be discussed in tutorials. |

| Module Mathematics 1 | |
|---|---|
| Internal number | MKIB140 |
| Coordinator | Prof. Dr. Frank Schaefer |
| Scope | 8.0 ECTS points, 6.0 Contact hours |
| Placement | 1st Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | Participants learn the mathematical basics from linear algebra, which are often used in computer science. These basics are specifically needed in computer graphics, robotic, cryptography. |
| Exams | Individual exams |
| Lecture Mathematics 1 | |
| Internal number | MKIB141 |
| Lecturer | Prof. Dr. Frank Schaefer |
| Scope | 5.0 ECTS points, 4.0 Contact hours 150 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <p>The participants should learn basic knowledge of mathematics and especially of linear algebra and acquire the methods to solve smaller mathematical tasks by themselves. In the part on linear algebra we will focus on knowledge needed in computer graphic and 3D simulations.</p> <p>Content of the lectures: Proof methods, relations, euivalence relations, modulo-calculation, Euklid's algorithm, functions, operations, groups, rings, fields, polynomial rings, finite fields, interpolation, vector spaces, basis, dimension, linear equations, rank, Gauß-Jordan-algorithm, determinant, matrices, linear map, inverse matrices, rotation, translation, scaling, scalarproduct, norm, vectorproduct, orthogonal matrizen, eigenvalues, eigenvectors, homogeneous coordinates.</p> |
| Recommended reading | Own writings from the blackboard, Exercises and summaries from the internet, Textbook: Peter Stingl: Mathematik für Fachhochschulen, Hanser Verlag, 8. Auflage, 2009, ISBN-10: 3-446-42065-7 |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Lecture, Exercises, Summary of the solutions in the lecture, Tutorials for further assistance |
| Lecture Mathematics 1 Laboratory | |
| Internal number | MKIB142 |
| Lecturer | Prof. Dr. Frank Schaefer |

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| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | Improving the knowledge of the related lectures, basics in computer-algebra systems, mathematical problem solving with computer assistance. With the help of the computer algebra system Maple different, applied mathematical questions from the fields of geometry, curves, interpolation and linear equations will be solved. It will be focussed on matrices and homogenous coordinates, which are an important foundation for computer graphic. |
| Recommended reading | Short introduction will be given. Exercises distributed in the classes and also available on the internet. |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Exercises in the labs with Maple (instructor will be present). |

| Module Language Competence | |
|---|---|
| Internal number | MKIB150 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 4.0 ECTS points, 4.0 Contact hours |
| Placement | 1st Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | The learning of a foreign language is an integral component of the in the course of studies communicated key qualification. |
| Exams | Individual exams |
| Lecture Foreign Languages | |
| Internal number | MKIB151 |
| Lecturer | Mehrere Dozenten |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | <p>After a grading test students can deepen their English skills to three grades. The entry level requires the competence grade A2 (basic user) in the six-stage common European reference framework. The first two grades (English for advanced learners 1 and 2) engage besides a recapitulation of grammar mainly in issues of job-oriented common language and cultural studies, e.g. job application letters, descriptions of products and services, business telephone calls, progress of formal and informal conferences, presentations etc. The thus achieved grade complies with 173 points in the TOEFL (computer-based) or the competence grade B2 (independent user) of the European reference framework. In the following grade special language skills (English for science and technics) are learnt: In business English the priority is on spoken language and small study groups. At the beginning of the semester each group founds its own company which advances dynamically during the course of the semester. At the same time vocabulary and phrasing in respect of topics like company structures, meetings, negotiation, marketing, production and sale, finances, comprehending of reports and presentations are gone through in order to make the attendees handle the language instruments to cope with each step of the simulation in English. The highlights of the course are a simulated exhibition, a hiring procedure and the group presentation. In technical English the priority is on the learning and practice of a technical basis vocabulary and typical expressions of technical communication.</p> |
| Recommended reading | Literature depends on grade, PowerPoint presentations, excercises, Videos, DVDs |

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| Exams | Written Exam 120 Min. (graded) |
| Comments | Lecture participation, short talks, discussions |

| Module Computer Science 2 | |
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| Internal number | MKIB210 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 2nd Semester |
| Pre-requisites with regard to content | Computer Science 1, Theoretical Computer Science |
| Pre-requisites according to the examination regulations | none |
| Competences | This module is based on "Informatik 1". Students will learn to use and apply universal algorithms and data structures. They will be able to analyse the complexity of these algorithms and proof their correctness. In practical assignments the students are enabled to implement some of these algorithms and data structures. |
| Exams | Individual exams |
| Lecture Computer Science 2 | |
| Internal number | MKIB211 |
| Lecturers | Dipl.-Ing. Christian Meder Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This lecture consists of four parts. The first one introduces basic concepts of object oriented programming on the basis of the programming language Java. The main issues are among other things: Language elements of Java, data abstraction and encapsulation, inheritance, polymorphism, generic programming, error handling and runtime type information. Based on these techniques an introduction in modeling of class diagrams with UML is made. Additional practical exercises with a standard IDE deepen the knowledge. The second part introduces the development of mobile Apps with graphical user interfaces for Android. The third part of the lecture deals with some important data structures like lists, hashmaps, tree and graphs and introduces basic algorithms to operate on them. The fourth part introduces the modularization of applications with Spring. |

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| Recommended reading | <p>On the lecture homepage: PowerPoint presentation, program examples, script</p> <p>Books:</p> <ul style="list-style-type: none"> - Christian Ullenboom, Java ist auch eine Insel, Galileo Computing - R. C. Martin, Clean Code, mitp - B. Lahres, G. Raýman, Objektorientierte Programmierung, Galileo Computing - G. Popp, Konfigurationsmanagement mit Subversion, Maven und Redmine, dpunkt - M. Jeckle, C. Rupp, J. Hahn, B. Zengler, S. Queins, UML 2 - glasklar, Hanser-Verlag - G. Saake, K. Sattler, Datenstrukturen und Algorithmen: Eine Einführung mit Java, dpunkt - O. Zeigermann: "JavaScript für JavaEntwickler", entwickler.press - D. Flanagan: "JavaScript - kurz & gut", O'Reilly - M. Haverbeke: "Eloquent JavaScript", kostenlos unter http://eloquentjavascript.net/ - JavaScript-Referenz: https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference |
| Exams | Written Exam 120 Min. (graded) |
| Comments | Preparation of lecture contents and exam |
| Lecture Computer Science 2 Exercise | |
| Internal number | MKIB212 |
| Lecturers | B.Sc. Manuel Vogel Dr. Martin Holzer Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |
| Content | The students solve Java and JavaScript exercises and model small applications using UML class diagrams. |
| Recommended reading | Script, compulsory and optional exercises on the homepage, solutions for optional exercises |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Practical exercise with discussion of solutions |

| Module Software Laboratory | |
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| Internal number | MKIB220 |
| Coordinator | Prof. Dr. Martin Sulzmann |
| Scope | 5.0 ECTS points, 4.0 Contact hours |
| Placement | 2nd Semester |
| Pre-requisites with regard to content | Computer Science 1 |
| Pre-requisites according to the examination regulations | none |
| Competences | <p>The students learn to apply the theoretical knowledge of "Informatik 2" using the programming language C++. They have design and implement projects with an increasing level of difficulty. The main topics are:</p> <ul style="list-style-type: none"> - Practicing object oriented programming techniques - Preferring abstractions over concrete implementations - Modeling class and package diagrams before starting an implementation - Code quality assurance by writing automated tests - Teamwork |
| Exams | Individual exams |
| Lecture Software Laboratory | |
| Internal number | MKIB221 |
| Lecturers | Prof. Dr. Heiko Körner Prof. Dr. Martin Sulzmann Prof. Dr. Christian Pape |
| Scope | 5.0 ECTS points, 4.0 Contact hours 150 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | The students implement projects with an increasing complexity in C++. They have to use generic classes, inheritance, polymorphism, abstract classes and interfaces and concepts for error handling and detection like exceptions and assertions. Additionally they will learn to use elements of the STL and to model the classes and their relationships with UML. |
| Recommended reading | <p>On the homepage: Project description with a step-by-step instruction, Java script, optional exercise with solutions, books:</p> <ul style="list-style-type: none"> - Ulrich Breyman, C++ - Einführung und professionelle Programmierung, Hanser-Verlag |
| Exams | Laboratory Work 1 Semester (not graded) |
| Comments | Laboratory work |

| Module Technologies of the Internet | |
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| Internal number | MKIB230 |
| Coordinator | Prof. Dr. Christian Zirpins |
| Scope | 5.0 ECTS points, 4.0 Contact hours |
| Placement | 2nd Semester |
| Pre-requisites with regard to content | Computer Science 1 |
| Pre-requisites according to the examination regulations | none |
| Competences | The two lectures on the topic of distributed systems ("Distributed Systems 1" and "Distributed Systems 2") teach both foundational and advanced principles that are illustrated through practical examples of existing paradigms and technologies. Principles treated in this course encompass foundations of goals and classes of distributed systems, as well as their architectures, processes, communication and name systems. Advanced principles include synchronisation, consistency and replicability, error-tolerance and security. The principles introduced in this course are exemplified through the paradigms of web-based systems and component-based systems. This includes sample implementations of individual principles. In addition, the course gives an introduction into the development of corresponding systems using actual technologies as examples. |
| Exams | Written Exam 120 Min. (graded) |
| Lecture Distributed Systems 1 | |
| Internal number | MKIB231.a |
| Lecturer | Prof. Dr. Christian Zirpins |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | <p>The course provides a practical introduction to the concepts and paradigms of distributed systems using the example of web technologies and application development on the web. This initially involves an introduction of the world wide web with basic protocols such as HTTP and other standards in the context of the Internet. After that an introduction to the design and construction of web applications is provided. This includes firstly the frontend development with HTML5, CSS3 as well as client-side JavaScript and secondly the backend development with server-side JavaScript on the Node.js platform. Interactions between frontend and backend follow modern REST/HTTP and AJAX techniques. In addition, mechanisms for personalization with cookies and sessions as well as to authenticate users are presented. The course closes with a detailed discussion of web application security.</p> <p>Upon completing this lecture class, students will acquire practical skills in the development and deployment of web applications, grounded in an understanding of distributed systems and web technologies. They will learn to proficiently use HTML5, CSS3, and JavaScript for frontend development, alongside server-side development with Node.js, enhancing their ability to create dynamic, full-stack web applications. Additionally, students will gain knowledge in implementing modern REST/HTTP and AJAX techniques for efficient frontend-backend communication, as well as in employing cookies, sessions, and authentication strategies for personalizing user experiences and ensuring application security. This comprehensive skill set will prepare students for a wide range of roles in web development and application design, equipping them with the necessary tools to address current and future challenges in the field.</p> |
| Recommended reading | <ul style="list-style-type: none"> - Semmy Purewal, "Learning Web App Development", O'Reilly, 1. Auflage, 2014 - David Gourley, Brian Totty, "HTTP: The Definite Guide", O'Reilly, 2002 - Mark Pilgrim, "HTML5 Up and Running", O'Reilly, 2010 (Online: http://diveintohtml5.info) - Marijn Haverbeke, "Eloquent JavaScript", No Starch Press, 2014 (Online: http://eloquentjavascript.net) - Peter Gasston, "The Book of CSS3 - A Developer's Guide to the Future of Web Design", 2nd Edition, No Starch Press, 2014 - Andy Budd, Emil Björklund, "CSS Mastery", Third Edition, Apress, 2016 (Online verfügbar im Hochschulnetz) - Ethan Brown, "Web development with Node and Express", O'Reilly, 2014 - Robert Prediger ; Ralph Winzinger, "Node.js : Professionell hochperformante Software entwickeln", Hanser, 2015 (Online verfügbar im Hochschulnetz) - Additional literature will be announced during the lecture |
| Exams | Module exam |
| Comments | <p>In preparation for individual lecture units, the self-study of basic content is required by means of the accompanying literature (relevant chapters will be announced in the event). Further independent work concerns the follow-up of the lecture contents and the exam preparation.</p> |
| Lecture Interfacedesign | |
| Internal number | MKIB231.b |

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| Lecturer | Prof. Daniel Schwarz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course provides students with the theoretical and applied knowledge about the creation of media-based web applications. This includes the foundations of the markup language HTML and Cascading Style Sheets, how to embed different types of media, as well as the conception, design and programming of responsive web applications. |
| Recommended reading | Lecture notes, slides (PDF), multiple examples of programs |
| Exams | Module exam |
| Comments | Preparation of lecture contents and exam |

| Module Mathematics 2 | |
|---|--|
| Internal number | MKIB240 |
| Coordinator | Prof. Dr.-Ing. Astrid Laubenheimer |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 2nd Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | |
| Exams | Written Exam 120 Min. (graded) |
| Lecture Analysis | |
| Internal number | MKIB241 |
| Lecturer | Prof. Dr.-Ing. Astrid Laubenheimer |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture Statistics | |
| Internal number | MKIB242 |
| Lecturer | Prof. Dr. Reimar Hofmann |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |

| Module Computer Engineering | |
|---|--|
| Internal number | MKIB250 |
| Coordinator | Prof. Dr. Christian Langen |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 2nd Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | Students will learn the basic concepts of computer engineering. They learn the mathematical concepts of number representation and Boolean algebra, which are required for the analysis and design of hardware circuits. They understand how the basic digital computing elements are constructed and how to combine them into complex switching networks. Furthermore, the students will be able to explain the structure and operation of current standard circuits such as adders or shift registers. Additionally, students are familiar with internal functions of typical processors. They are able to implement the hardware related software parts using the "C" programming language including the use of typical peripherals. All knowledge gained is reinforced by practical work in the laboratory. |
| Exams | Individual exams |
| Lecture Computer Engineering | |
| Internal number | MKIB251 |
| Lecturers | Prof. Dr. Dirk Hoffmann Prof. Dr. Christian Langen |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | On the processor side, the lecture will cover the following, basic processor hardware, processor architecture, addressing modes, instructions, memory mapping, peripherals and bit processing. The special features of the programming languages C / C++ needed for hardware programming will also be covered. |
| Recommended reading | Powerpoint slide, personal notes, web based exercises and the suggested solution (provided upon request). |
| Exams | Written Exam 90 Min. (graded) |
| Comments | The student will be required to come prepared to participate in the lecture and will be expected to be able to develop a summary upon completion of the lecture, all exercises provided for reinforcement will be required to be individual work. |

| Lecture Digital Technology Laboratory | |
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| Internal number | MKIB252 |
| Lecturers | Prof. Dr. Albrecht Ditzinger Prof. Dr. Dirk Hoffmann |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | Lab experiments will be conducted using: - Digital Circuits - Microcontrollers - Peripherals - Timers and Counters |
| Recommended reading | Exercises, equipment provided and various manuals and other support material. |
| Exams | Exercise 1 Semester (not graded) |
| Comments | All laboratory work will be group work. It will include the conduct of the experiment, demonstration of the required result and be prepared to answer questions on the work and the results. Groups are on their own and are required to come to the laboratory prepared to conduct the exercise. Each group will prepare a final documentation of the exercise. |

| Module System Software and System Programming | |
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| Internal number | MKIB310 |
| Coordinator | Prof. Dr. Thomas Fuchß |
| Scope | 9.0 ECTS points, 8.0 Contact hours |
| Placement | 3rd Semester |
| Pre-requisites with regard to content | Computer Science 1, Computer Science 2, Software Laboratory, Theoretical Computer Science |
| Pre-requisites according to the examination regulations | none |
| Competences | |
| Exams | Individual exams |
| Lecture System Software | |
| Internal number | MKIB311 |
| Lecturer | Prof. Dr. Thomas Fuchß |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <p>The "System Software" course focuses on the fundamental methods and techniques of modern operating systems. Students learn to apply these techniques independently and in a structured way to solve typical system-related development tasks. The course itself is divided into four parts:</p> <ul style="list-style-type: none"> - Process management and scheduling - File systems and persistence - Memory virtualisation - Concurrency: Prozesse und Threads <p>While the first part establishes the relationship between computer architecture and operating system, the following parts focus on more specific problems and their typical solutions. In particular, the following topics are covered: Processor virtualisation, limited direct execution, scheduling algorithms, key file system concepts, memory management, segmentation, page frames, processes, threads, mutexes, semaphores, condition variables, monitors and patterns for parallel programming.</p> |

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| Recommended reading | Slides, videos, textbooks, and other literature: - Arpaci-Dusseau, Remzi H.; Arpaci-Dusseau, Andrea C. Operating Systems: Three Easy Pieces, (V. 1.00) Arpaci-Dusseau Books, 2018 - Tanenbaum, Andrew S.; Bos, H. Modern Operating Systems (4th Edition) – Pearson, 2014 - Stallings, W. Operating Systems: Internals and Design Principles (8th Edition) – Pearson, 2014 |
| Exams | Written Exam 90 Min. (graded) |
| Comments | The lecture will take the form of seminars with exercises. |
| Lecture System Programming | |
| Internal number | MKIB312 |
| Lecturer | Prof. Dr. Carsten Sinz |
| Scope | 5.0 ECTS points, 4.0 Contact hours 150 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | The course is organized in three exercises, covering compiler construction and interprocess communication. Starting with a scanner, the students consolidate their skills in handling large dynamic data structures, pointers, and doing low level IO. The second exercise focuses on the development of a recursive descendent parser and a short introduction to semantic analysis and code generation. The third exercise is an introduction to the field of interprocess communication. Within the exercise, elementary techniques and concepts are trained: - generating processes / threads - terminating processes / threads - synchronizing processes / threads |
| Recommended reading | Slides and textbooks: - Eduard Glatz. Betriebssysteme: Grundlagen, Konzepte, Systemprogrammierung - dpunkt.verlag, 2010 - A.V. Aho, M.S. Lam, R. Sethi und J.D. Ullman. Compiler - Prinzipien, Techniken und Werkzeuge - 2nd Edition - München: Pearson Studium, 2008. - D. Grune et. al. Modern compiler design - Wiley, 2000. - Andrew S. Tanenbaum. Betriebssysteme, Entwurf und Realisierung Teil 1 - Hanser, 1990. |
| Exams | Laboratory Work 1 Semester (not graded) |
| Comments | Attended teamwork and three lectures. |

| Module Databases and Communication Networks 1 | |
|---|--|
| Internal number | MKIB320 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 3rd Semester |
| Pre-requisites with regard to content | Theoretical Computer Science, Mathematics 1, Computer Science 1 |
| Pre-requisites according to the examination regulations | none |
| Competences | <p>Students know the common models of communication and database technology and are able to classify and evaluate unknown, e.g. new systems. They are aware of the advantages and disadvantages of different architectures and take them into account when selecting the architecture for their own products. In the database area, they have mastered the basics of the current SQL standard and are able to select and set up database systems and keep them securely in operation. Students are able to analyse given facts, transfer these facts into a normalized data model, create this data model under SQL and use the resulting SQL databases under object-oriented languages.</p> <p>In the area of communication networks, students learn to analyze application scenarios and problem situations by structuring them using the Internet layer model and applying their knowledge of protocols, mechanisms and programming of the individual layers in order to design applications taking communication aspects into account.</p> |
| Exams | Written Exam 120 Min. (graded) |
| Lecture Databases 1 | |
| Internal number | MKIB321.a |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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|---|---|
| Content | <p>The lecture covers the following topics:</p> <ul style="list-style-type: none"> - Introduction to information systems - Basics of database systems - Database organization - Data models - Database schema - Architecture: 3-tier model, client-server architecture - Current SQL standard (queries, DDL, DML, in particular SQL:2003 with object-oriented extensions, NF2, window functions) - Transactions - JDBC - ER modeling - Mapping entities and relationships to relational data models - Normalization - OR mapping |
| Recommended reading | <ul style="list-style-type: none"> - Script - Example databases of the lecture for the common database systems - Exercises - Sample programs - Collection of old exams and their solutions - Edwin Schicker, "Datenbanken und SQL", Springer Vieweg, 2017, ISBN: 978-3834817327 - Gunter Saake, Kai-Uwe Sattler, "Datenbanken - Konzepte und Sprachen", mitp, 2013, ISBN: 978-3286694530 |
| Exams | Module exam |
| Comments | |
| Lecture Communication Networks 1 | |
| Internal number | MKIB321.b |
| Lecturer | Prof. Dr. Oliver Waldhorst |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | Distributed systems; data transmission and communication networking techniques (circuit/packet switching); Serial / Parallel, fault detection-/protection mechanisms; service and protocol specification; flow control; negotiating qualities of service; multiplexing; time charts and finite state machines as a means of describing protocols; OSI reference model (Layers, protocols, services), protocol-stacks; the physical layer: analog and digital transmission, transmission media, STP/UDP, ISDN, xDSL; the data link layer: character and bitorientierte protocols (BSC, HDLC), Local area networks (LAN e.g.ETHERNET, Token Ring), topology, access procedures; the network layer: connection oriented and connectionless services, routing, congestion control; the transport layer: transport layer classes; RPC; socketprogramming; TCP / IP; the application system: Internet, services and protocols in the Internet environment (Telnet, FTP , SMTP, SNMP, DNS, Web, HTML / HTTP); |
| Recommended reading | • Word handouts • Tanenbaum: Computer Networks, Pearson Studies, 2003 (german edition) • Collection of old exams and their solutions |
| Exams | Module exam |
| Comments | Lecture supported by transparencies and Power Point Slides. Student questions are welcome. In parallel to the lecture the participants should control their knowledge using the old exams and their solutions (available on the server). |
| Lecture Databases 1 Laboratory | |
| Internal number | MKIB322 |
| Lecturers | M.Sc. Amir Bukhari Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | A database application for a flight reservation system is designed and prototypically implemented. This includes setting up a DB scheme, the design and testing of SQL queries, the use of transactions and transaction levels, as well as programming a seat reservation transaction with Java, JDBC and SQLJ-based on Oracle. |
| Recommended reading | Sample database, JUnit test cases, test-GUI; Textbooks: - "Grundlagen von Datenbanksystemen", Ausgabe Grundstudium (Taschenbuch) von Ramez Elmasri, Shamkant B. Navathe, Pearson, 2005, ISBN: 3827371538 - "Datenbanksysteme" von Alfons Kemper, Andre Eickler, Oldenbourg, 2006, ISBN: 3486576909 - "Datenbanken & Java. JDBC, SQLJ, ODMG und JDO" von Gunter Saake, Kai-Uwe Sattler, Dpunkt Verlag, 2003, ISBN: 3898642283 |
| Exams | Laboratory Work 1 Semester (not graded) |

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| Comments | Supervised laboratory with final presentation on the computer, self-work, preparation and after working of lab sessions, prepare a report of the laboratory tasks. |
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| Module Man-Machine-Communication 1 | |
|---|---|
| Internal number | MKIB330 |
| Coordinator | Prof. Dr. Ulrich Bröckl |
| Scope | 5.0 ECTS points, 3.0 Contact hours |
| Placement | 3rd Semester |
| Pre-requisites with regard to content | Computer Science 1 |
| Pre-requisites according to the examination regulations | none |
| Competences | The courses of this module teach the students fundamental programming and algorithmic skills. The students should be enabled to analyze small problems, find solutions to these problems, and develop them in the Java programming language. |
| Exams | Individual exams |
| Lecture Man-Machine-Communication | |
| Internal number | MKIB331 |
| Lecturer | Prof. Dr. Ulrich Bröckl |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | - "GUI Design Essentials " von Susan Weinschenk, Pamela Jamar, Sarah C. Yeo, Verlag John Wiley & Sons, 1997, ISBN: 0471175498 |
| Exams | Written/verbal Exam 20 Min. (graded) |
| Comments | |
| Lecture Man-Machine-Communication Design | |
| Internal number | MKIB332 |
| Lecturer | B.Sc. Valeria Zitz |
| Scope | 3.0 ECTS points, 1.0 Contact hours 90 Stunden gesamt, davon 15 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |
| Content | An MMC-task which is standard practice is designed starting from task analysis up to the paper prototype. This prototype is subject - possibly over several iterations - of a usability test until the specified quality targets are reached. |
| Recommended reading | Script, eye-tracker and user monitoring space in the Usability Lab Textbooks: - "GUI Design Essentials " von Susan Weinschenk, Pamela Jamar, Sarah C. Yeo, Verlag John Wiley & Sons, 1997, ISBN: 0471175498 |
| Exams | Homework 1 Semester (not graded) |

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| Comments | Supervised group work with presentation and discussion; test the usability of the prototype, prepare a test report with proposals for improvements. |
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| Module Media Project | |
|---|---|
| Internal number | MKIB340 |
| Coordinator | Prof. Thomas Hinz |
| Scope | 5.0 ECTS points, 5.0 Contact hours |
| Placement | 3rd Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | |
| Exams | Individual exams |
| Lecture Media Project | |
| Internal number | MKIB341 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 20 Min. (graded) |
| Comments | |
| Lecture Media Project Exercise | |
| Internal number | MKIB342 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 3.0 ECTS points, 3.0 Contact hours 90 Stunden gesamt, davon 45 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Exercise 1 Semester (not graded) |
| Comments | |

| Module Business Administration | |
|---|---|
| Internal number | MKIB350 |
| Coordinator | Prof. Dr. Uwe Haneke |
| Scope | 4.0 ECTS points, 4.0 Contact hours |
| Placement | 3rd Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | |
| Exams | Individual exams |
| Lecture Business Administration | |
| Internal number | MKIB351 |
| Lecturer | Prof. Dr. Uwe Haneke |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <p>Students are introduced to the basic concepts of business administration. They learn about economic processes and relationships and are familiarized with the typical processes and requirements in a company. They are able to name and outline the various areas of business administration.</p> <p>With the help of various tools and concepts, students are able to describe and analyze the situation of a company.</p> <p>In addition, students will be able to calculate and analyze various key figures (KPI) that provide information about the performance of a company.</p> <p>As part of the Business Administration lecture, the areas of economic environment (economics), organization, investment and financing, marketing and accounting are dealt with in depth so that students gain a holistic overview of how a company functions and the resulting requirements.</p> |
| Recommended reading | <ul style="list-style-type: none"> - Slides - Case studies - Exercises |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |

| Module Internship Preparation and Roundup | |
|---|--|
| Internal number | MKIB4P0 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 6.0 ECTS points, 4.0 Contact hours |
| Placement | 4th Semester |
| Pre-requisites with regard to content | Computer Science 1 |
| Pre-requisites according to the examination regulations | Vorstudium |
| Competences | Students learn important job-related skills that are also relevant for the practical semester. They recognise how projects are managed and results presented using the Scrum process model. Students also learn techniques for the professional creation of scientific documents. To do this, they use common software products such as MS Office, create suitable calculations, evaluate them efficiently and visualise the results in an appealing form. After completing the programme, students will be able to work in Scrum teams, prepare data in a targeted manner and use modern presentation techniques. |
| Exams | Individual exams |
| Lecture Internship Preparation | |
| Internal number | MKIB4P1 |
| Lecturers | Dr. Martin Holzer B.Sc. Veit Richter |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course deals with the general handling of MS Office products and gives specifically an introduction to the main functions of MS-Excel. Topics include input methods, formulas, chart depictions and search functions. Basic knowledge about the programming in VBA are also taught. These methods will also be used for macro skripts in MS-Word. Afterwards, the students have learned how to solve typicals problems efficiently with these today's standard programs. |
| Recommended reading | MS-PowerPoint slides, an accompanying script for reference, exercises. |
| Exams | Exercise 1 Week (not graded) |
| Comments | The course consists of of a lecture (50%) and supervised, practical exercises (50%). |
| Lecture Internship Roundup | |
| Internal number | MKIB4P2 |
| Lecturers | Dipl. WiInf. Lars Thoralf Thielemann Prof. Dr. Heiko Körner |

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| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course aims to systematically reflect the internship done by each student and especially to advise them with their written assignments to be submitted. To this end, we will discuss the entire process of scientific writing, address each particular step in more detail, and deduce general guidelines towards a smooth implementation into practice. Furthermore, this course provides a thorough introduction to the use of LaTeX, a typesetting system widespread throughout the scientific community. |
| Recommended reading | - Slides provided by lecturer, individual notes taken by students - General literature on scientific writing (e.g., "Writing scientific English" by Tim Skerns) - General literature / online tutorials on the LaTeX typesetting system |
| Exams | Exercise 1 Week (not graded) |
| Comments | Students are expected to attend this course regularly and to actively take part in discussions and practical lab exercises. To pass this course, they must further submit their written assignment by the end of the course (meeting the demands specified by the lecturer in the first session). |

| Module Internship | |
|---|--|
| Internal number | MKIB4PX0 |
| Coordinator | Prof. Dr. Thomas Fuchß |
| Scope | 24.0 ECTS points, 0.0 Contact hours |
| Placement | 4th Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | Vorstudium |
| Competences | The internship is designed to deepen the previously acquired knowledge and skills by qualified collaboration in a larger project. The focus is on improving the technical competence and the development of social and personal skills. The student needs to assert himself as an independent member of the team. He becomes acquainted with new fields of duty and will become familiar with new tools. He learns to evolve himself and to assess his skills. The internship may be pursued in a company, in a research facility or an authority. |
| Exams | Individual exams |
| Lecture Internship | |
| Internal number | MKIB4PX1 |
| Lecturer | Prof. Dr. Thomas Fuchß |
| Scope | 24.0 ECTS points, 0.0 Contact hours 720 Stunden gesamt, davon 0 Stunden Kontaktstudium. |
| Type/mode | On-the-job Training |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Hands-on Work 95 Days (not graded) |
| Comments | |

| Module Software Engineering and Distributed Systems 2 | |
|--|---|
| Internal number | MKIB510 |
| Coordinator | Prof. Dr. Thomas Fuchß |
| Scope | 8.0 ECTS points, 7.0 Contact hours |
| Placement | 5th Semester |
| Pre-requisites with regard to content | Internship, Technologies of the Internet, Man-Machine-Communication 1, Computer Science 2, Databases and Communication Networks 1 |
| Pre-requisites according to the examination regulations | Vorstudium |
| Competences | <p>The students learn how to work independently and productively in large software projects. This includes the decomposing of development tasks as well as the determination and assessment of appropriate architectures. They are able to capture the necessary steps in the context of a given task, to structure and clarify their decisions using suitable tools and methodologies, independently.</p> <p>In this context, the students also gain the ability to recognize and classify goals and problems of distributed software systems. They can explain the general concepts of architectures, processes, communication, naming, coordination, replication fault tolerance and security, and apply them to the construction of distributed software services and applications.</p> |
| Exams | Written Exam 120 Min. (graded) |
| Lecture Softwareengineering Laboratory | |
| Internal number | MKIB511 |
| Lecturer | Prof. Dr. Thomas Fuchß |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | Accompanying the software engineering lecture this course project covers a complete step in a modern software development process. Beginning with requirement engineering and analysis, central use cases are designed and finally implemented in Java. By this students learn more than facts, they get experiences and they understand the meaning of terms like architecture-oriented, iterative, incremental, or component-based. |

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| Recommended reading | <p>Slides, videos, textbooks, and other literature:</p> <ul style="list-style-type: none"> - Arlow, J.; Neustadt, I.: UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design, 2. ed. - Addison-Wesley Professional, 2005. - Shimp, D. and Rawsthorne, D. Exploring Scrum: The Fundamentals – CreateSpace, 2011. - Jacobson, I.; Booch, G. and Rumbaugh, J.: The unified software development process - Reading, Mass.: Addison-Wesley, 1999. - Kim, G.; Humble, J.; Debois, P. und Willis, J.: Das DevOps-Handbuch: Teams, Tools und Infrastrukturen erfolgreich umgestalten - Heidelberg: O'Reilly; Heidelberg: dpunkt.verlag, 2017. - Larman, C.: Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, 3. ed. - Upper Saddle River, NJ : Prentice Hall, 2004. - Larman, C. und Vodde, B.: Large-Scale Scrum: Scrum erfolgreich skalieren mit LeSS - Heidelberg: dpunkt.verlag, 2017. - Oestereich, B.: Developing Software with UML: Object-Oriented Analysis and Design in Practice 2. ed. - Addison-Wesley Professional, 2003. - Oestereich, B.: Analyse und Design mit UML 2.1: Objektorientierte Softwareentwicklung, 8. ed. - München; Wien : Oldenbourg, 2006 - OMG Object Management Group. Unified Modeling Language (OMG UML) Version 2.5.1 – OMG, 2017. - Seidl, M.; Scholz, M. and Huemer, C.: UML @ Classroom: An Introduction to Object-Oriented Modeling, Springer, 2015. - Schwaber, K. and Sutherland, J. The Scrum Guide: The Definitive Guide to Scrum – Scrumguides.org, 2020. - Sommerville, I.: Software Engineering, 10. Auflage - Pearson, 2018. - Wintersteiger, A.: Scrum: Schnelleinstieg, 4. Auflage - Frankfurt am Main: entwickler.press, 2018. |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Attended teamwork |
| Lecture Distributed Systems 2 | |
| Internal number | MKIB512.a |
| Lecturer | Prof. Dr. Christian Zirpins |
| Scope | 3.0 ECTS points, 3.0 Contact hours 90 Stunden gesamt, davon 45 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | <p>The lecture conveys both fundamental and extended principles of distributed systems and illustrates these in practical form on the basis of concrete paradigms and technologies. The spectrum of principles covered includes fundamental aspects of the objectives and classes of distributed systems, as well as their architectures, processes, communications, and naming. Advanced principles include coordination, consistency and replication, fault tolerance and security. The covered principles are exemplified by various paradigms. Here, exemplary implementations of individual principles are presented. In addition, an introduction to the development of corresponding systems based on concrete software technologies is given.</p> <p>Upon completing this lecture class, students will achieve a comprehensive understanding of the principles underlying distributed systems, ranging from their fundamental objectives and architectures to advanced concepts such as coordination, consistency, replication, fault tolerance, and security. They will gain insights into the practical application of these principles through the examination of specific paradigms and technologies, enhancing their ability to analyze and design distributed systems. Moreover, the introduction to developing these systems using concrete software technologies will equip students with the practical skills necessary for implementing robust, efficient, and secure distributed systems in various computing environments.</p> |
| Recommended reading | <ul style="list-style-type: none"> - Andrew S. Tannenbaum, Marten van Steen, "Verteilte Systeme, Prinzipien und Paradigmen", 2. aktualisierte Auflage, Pearson Studium, 2008, ISBN 978-3-8273-7293-2 - George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, "Distributed Systems, Concepts and Design", Fifth Edition, Addison-Wesley, 2012, ISBN 978-0-13-214301-1 - Additional literature will be announced during the lecture |
| Exams | Module exam |
| Comments | Autonomous work includes pre- and post processing of lectures, exercises and exam preparation. |
| Lecture Software Engineering | |
| Internal number | MKIB512.b |
| Lecturer | Prof. Dr. Thomas Fuchß |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | <p>With the experience gained during internships in mind, the "Software Engineering" course develops techniques and methods for large-scale structured software development. In addition to the repetition and consolidation of already learned elementary concepts such as: Object, Class, Association, Method, Inheritance or Polymorphism, the focus is on the software development process. Based on their practical experience, the students recognize the challenges that modern, agile software development poses for a structured and organized development process. Building on established process models, such as the Unified Software Development Process (Jacobson, Booch, Rumbaugh), in conjunction with Scrum and UML as a description language, students are given a framework to master this challenge. They learn to act independently in an agile environment and to make development decisions and document them using UML.</p> <p>In the associated practical course, the first iteration of a software development is carried out - from gathering the requirements to the creation of an analysis and design model up to the implementation in Java. The students not only learn what is hidden behind terms such as use-case-driven, architecture-oriented, iterative, incremental, and component-based, they also experience it and thereby learn to participate in an agile development team.</p> |
| Recommended reading | <p>Slides, videos, textbooks, and other literature:</p> <ul style="list-style-type: none"> - Arlow, J.; Neustadt, I.: UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design, 2. ed. - Addison-Wesley Professional, 2005. - Shimp, D. and Rawsthorne, D. Exploring Scrum: The Fundamentals – CreateSpace, 2011. - Jacobson, I.; Booch, G. and Rumbaugh, J.: The unified software development process - Reading, Mass.: Addison-Wesley, 1999. - Kim, G.; Humble, J.; Debois, P. und Willis, J.: Das DevOps-Handbuch: Teams, Tools und Infrastrukturen erfolgreich umgestalten - Heidelberg: O'Reilly; Heidelberg: dpunkt.verlag, 2017. - Larman, C.: Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, 3. ed. - Upper Saddle River, NJ : Prentice Hall, 2004. - Larman, C. und Vodde, B.: Large-Scale Scrum: Scrum erfolgreich skalieren mit LeSS - Heidelberg: dpunkt.verlag, 2017. - Oestereich, B.: Developing Software with UML: Object-Oriented Analysis and Design in Practice 2. ed. - Addison-Wesley Professional, 2003. - Oestereich, B.: Analyse und Design mit UML 2.1: Objektorientierte Softwareentwicklung, 8. ed. - München; Wien : Oldenbourg, 2006 - OMG Object Management Group. Unified Modeling Language (OMG UML) Version 2.5.1 – OMG, 2017. - Seidl, M.; Scholz, M. and Huemer, C.: UML @ Classroom: An Introduction to Object-Oriented Modeling, Springer, 2015. - Schwaber, K. and Sutherland, J. The Scrum Guide: The Definitive Guide to Scrum – Scrumguides.org, 2020. - Sommerville, I.: Software Engineering, 10. Auflage - Pearson, 2018. - Wintersteiger, A.: Scrum: Schnelleinstieg, 4. Auflage - Frankfurt am Main: entwickler.press, 2018. |

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| Exams | Module exam |
| Comments | The lecture will take the form of seminars with exercises. |

| Module Databases and Communication Networks 2 | |
|---|---|
| Internal number | MKIB520 |
| Coordinator | Prof. Dr. Zoltán Nochta |
| Scope | 5.0 ECTS points, 4.0 Contact hours |
| Placement | 5th Semester |
| Pre-requisites with regard to content | Databases and Communication Networks 1 |
| Pre-requisites according to the examination regulations | Vorstudium |
| Competences | |
| Exams | Written Exam 120 Min. (graded) |
| Lecture Databases 2 | |
| Internal number | MKIB521.a |
| Lecturer | Prof. Dr. Zoltán Nochta |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | - "Datenbanksysteme" von Alfons Kemper, Andre Eickler - "Database Solutions" von Thomas Connolly, Carolyn Begg |
| Exams | Module exam |
| Comments | |
| Lecture New Lecture | |
| Internal number | MKIB521.b |
| Lecturer | Prof. Dr. Oliver Waldhorst |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The buzzword "Cloud" represents a variety of interesting technologies which gained importance in the life of a computer science professional. Those are being collected, examined, explained and understood during the course. Primary objective is usefulness for the student, regardless of whether he acts as a cloud user, developer, administrator or even entrepreneur. Understand the broad meaning of "Cloud Computing" from a variety of perspectives: Definition, use cases, technology basics, key players, APIs, scaling, redundancy ... |
| Recommended reading | Powerpoint slides |
| Exams | Module exam |

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| Comments | |
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| Module Computer Graphics | |
|---|---|
| Internal number | MKIB530 |
| Coordinator | Prof. Dr. Peter Henning |
| Scope | 5.0 ECTS points, 3.0 Contact hours |
| Placement | 5th Semester |
| Pre-requisites with regard to content | Technologies of the Internet |
| Pre-requisites according to the examination regulations | Modul Internship |
| Competences | |
| Exams | Individual exams |
| Lecture Computer Graphics | |
| Internal number | MKIB531 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | Henning, Taschenbuch Multimedia. |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Computer Graphics Laboratory | |
| Internal number | MKIB532 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 3.0 ECTS points, 1.0 Contact hours 90 Stunden gesamt, davon 15 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | Graphical primitives, polygonalmodels, transformations. Coloring, lighting and textures. Animation through sensors and interpolators. Elements of OpenGL: Vertices, polygons, transformation matrices. Lighting and textures |
| Recommended reading | Material from the lecture |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Presence required, solution of lab problems |

| Module Student Research Project | |
|---|--|
| Internal number | MKIB540 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 5.0 ECTS points, 4.0 Contact hours |
| Placement | 5th Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | none |
| Competences | Students are able to independently apply the knowledge acquired during their studies to a completed task. They analyse the problem, create a concept, think about an implementation and then implement it independently. In addition to the purely practical work, they produce documentation. The ability to defend their own work is put into practice in a colloquium. The research project thus serves as ideal preparation for the final thesis, in which the students will deal with a new problem in a very similar way. |
| Exams | Individual exams |
| Lecture Student Research Projekt | |
| Internal number | MKIB541 |
| Lecturer | Alle Dozenten |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |
| Content | A student research project is the independent processing of a topic in the field of software or hardware. The aim is to carry out a practical task; however, work in the areas of evaluation or literature research is also possible. The students analyse the task and research which tools can be used to best implement the task. They then apply these accordingly. Comprehensive documentation must be prepared for the research project, covering all steps of the task and completion (e.g. the exact problem definition, the concept, the implementation, operating instructions and more). The scope and exact nature of this documentation is determined according to the requirements of the work. The research project is thus a preparation for the later final thesis, which the students will write according to very similar guidelines. |
| Recommended reading | |
| Exams | Homework 1 Semester (not graded) |
| Comments | All work will be individual work and will include basic literature research, system analysis, coding, documentation, and oral presentation. |
| Lecture Student Research Projekt Colloquium | |
| Internal number | MKIB542 |

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|-------------------------|--|
| Lecturer | Alle Dozenten |
| Scope | 1.0 ECTS points, 0.0 Contact hours 30 Stunden gesamt, davon 0 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |
| Content | The colloquium marks the conclusion of the project work. Students present their results in a short presentation and then take part in a discussion. In doing so, they demonstrate that they are able to explain and defend the problem, the realisation of the work and the solution found in a short, concise form. |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (graded) |
| Comments | All work will be individual work and will include the presentation, discussion, defense of the work. |

| Module ERP Systems | |
|---|---|
| Internal number | MKIB550 |
| Coordinator | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 5th Semester |
| Pre-requisites with regard to content | Business Administration |
| Pre-requisites according to the examination regulations | Vorstudium |
| Competences | The students shall learn to think in business processes on the basis of integrated ERP systems. They should recognize the interdependence of operational functions, and thus deepen their basic economical knowledge about processes (horizontal integration). Further, the students recognize the need for vertical integration as a prerequisite for the development of ERP systems for management information systems. In addition the students learn architecture, design and development of ERP systems. |
| Exams | Written Exam 90 Min. (graded) |
| Lecture ERP Systems | |
| Internal number | MKIB551.a |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 3.0 ECTS points, 3.0 Contact hours 90 Stunden gesamt, davon 45 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Contents: ERP basics, system integration, system architectures, and logistics: Distribution (SD), Materials Management (MM), Production Planning and Control (PP) as well as Financial Accounting (FI) and Controlling (CO). In addition, an overview is given to the software selection. |
| Recommended reading | Recommended reading: Lecture material completely as PowerPoint documents, blackboard notes for interactive development of central problem positions, a main textbook to ERP, a main textbook to SAP ECC 6.0. |
| Exams | Module exam |
| Comments | Kind of work: Lecture participation |
| Lecture IT Service Management | |
| Internal number | MKIB551.b |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture ERP Laboratory | |
| Internal number | MKIB552 |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 1.0 Contact hours 60 Stunden gesamt, davon 15 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | <p>Contents: The materials provide an introduction to Global Bike Inc. (GBI), an SAP ERP navigation case study, exercises and case studies for the following SAP ERP Modules: Sales (SD), Materials Management (MM), Production Planning and Control (PP), Financial Accounting (FI), Controlling (CO) .</p> <p>Independent work individually or as a group as a couple of the case studies in an SAP ERP system. Software: SAP ECC 6.0, Database: GBI</p> <p>Alternative to the laboratory: Introduction to the ABAP programming language with practical exercises in the SAP NetWeaver Application Server ABAP.</p> <p>Learning objectives include: language elements Workbench database, selection screens, function modules, ABAP OO.</p> |
| Recommended reading | Recommended reading: Extensive material for introduction to the topic as well as on each case study. Provisioning is about the blended learning and e-learning platform ILIAS. |
| Exams | Exercise 1 Semester (not graded) |
| Comments | <p>Kind of work: Labor participation and preparation of laboratory results.</p> <p>Exercises and case studies from the curriculum GBI powered by the SAP University Alliances community. Some case studies have been extended to more detailed tasks.</p> |

| Module Embedded Software | |
|---|---|
| Internal number | MKIB610 |
| Coordinator | Prof. Dr. Dirk Hoffmann |
| Scope | 5.0 ECTS points, 4.0 Contact hours |
| Placement | 6th Semester |
| Pre-requisites with regard to content | Computer Science 1, Computer Science 2, Computer Engineering |
| Pre-requisites according to the examination regulations | Modul Internship |
| Competences | The courses of this module teach the students the fundamental concepts about embedded systems. Students know the basic terminology about embedded systems and they are able to distinguish different types of real-time systems from each other. By studying the CAN bus technology, students get to know a typical communication medium and acquaint with the CDMA technology an important coding scheme for data transmission. Students are able to implement typical programming tasks in the field of embedded systems in C. Furthermore, students learn how to deal with software tools that are suited for analyzing and developing embedded systems. |
| Exams | Individual exams |
| Lecture Embedded Software | |
| Internal number | MKIB611 |
| Lecturer | Prof. Dr. Dirk Hoffmann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The lecture introduces software development methods for embedded real time systems. Embedded systems within the meaning of this lecture are systems that are controlled by computer software and are part of a larger system whose primary function is not compute-oriented. For real-time systems, the result has to be computed within a specified time frame. In particular, topics from the following areas are covered: Design and architecture of automotive ECUs, bus architectures, data transmission encodings, Embedded C. |
| Recommended reading | Slides, blackboard, exercise sheets |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Lecture |
| Lecture Embedded Software Laboratory | |
| Internal number | MKIB612 |
| Lecturer | Prof. Dr. Dirk Hoffmann |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |

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| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | With the help of the modeling tool CANoe the participants design a control unit in the field of automotive electronics. The project also includes tasks from the field of signal decoding. |
| Recommended reading | Software and hardware tools für designing automative ECUs |
| Exams | Exercise 1 Semester (not graded) |
| Comments | Practical work |

| Module Man-Machine-Communication 2 | |
|---|--|
| Internal number | MKIB620 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 6.0 ECTS points, 6.0 Contact hours |
| Placement | 6th Semester |
| Pre-requisites with regard to content | Computer Graphics, Computer Science 1, Computer Science 2, Media Design, Media Project, Man-Machine-Communication 1, Software Engineering and Distributed Systems 2, Software Laboratory |
| Pre-requisites according to the examination regulations | none |
| Competences | This module integrates different media technologies. The students will be able to write user interfaces for rich fat clients and mobile media applications. They learn how computer vision works and how computer vision ist used in media applications. |
| Exams | Verbal Exam 20 Min. (graded) |
| Lecture Graphical User Interfaces | |
| Internal number | MKIB621.a |
| Lecturer | Prof. Dr. Matthias Wölfel |
| Scope | 3.0 ECTS points, 2.0 Contact hours 90 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The lecture first deals with SWT/JFace and the Eclipse Rich Client Platform 4 (RCP), which uses SWT and JFace as its basis. The most important topics are the model-view-controller pattern, layout management and event handling using the observer pattern. Based upon this techniques advanced technologies like the separation of business logic and user interface code using data binding and dialog control are presented. Other topics are internationalization and multithreading in the context of user interfaces. The last part of the lecture shows the declarative construction of user interfaces and the application of the RCP framework. |

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| Recommended reading | Books and Web sites: - Marc Teufel, "Eclipse 4", entwickler.press, Oktober 2012 - Lars Vogel, "Eclipse 4 Application Development", Mai 2012 - M. Marinilli, "Professional Java User Interfaces", Wiley & Sons, 2006 - R. Warner, R. Harris, "The Definite Guide to SWT and JFace", Apress, 2007 - M. Scarpino et.al., "SWT/JFace in Action", Manning Publications Co., 2005 - J. McAffer, J. M. Lemieux, "Eclipse Rich Client Platform", Addison-Wesley Longman (Pearson Education), 2010 - G. Wütherich, N. Hartmann, B. Kolb, M. Lübken, "Die OSGi Service Platform", dpunkt-Verlag, 2008 - http://www.ralfebert.de/rcpbuch/ - http://www.eclipse.org/swt/ - http://www.eclipse.org/articles/Article-UI-Guidelines/Index.html - http://www.eclipse.org/swt/snippets/ - http://wiki.eclipse.org/index.php/JFaceSnippets - http://www.java2s.com/ |
| Exams | Module exam |
| Comments | Lecture preparation, exam preparation, implementing the bonus exercise, 30% of the lecture is held as a computer exercise |
| Lecture App-Programming | |
| Internal number | MKIB621.b |
| Lecturer | Prof. Dr. Matthias Wölfel |
| Scope | 1.0 ECTS points, 2.0 Contact hours 30 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Exercise |
| Language of instruction | German |
| Content | The lecture teaches the construction of mobile media applications. The main concepts are discussed using the Android platform. In a first part, the basic technologies and limitations of mobile devices are shown. The second part examines different development strategies like native applications, device independent abstractions and web applications. A main part of the lecture is the integration of different media types into mobile applications and the constraints the developer has to keep in mind. |
| Recommended reading | will be announced |
| Exams | Module exam |
| Comments | Lecture with exercise |
| Lecture Computer Vision | |
| Internal number | MKIB622 |
| Lecturer | Prof. Dr.-Ing. Astrid Laubenheimer |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |

| Module Communication Competence | |
|---|--|
| Internal number | MKIB630 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 7.0 ECTS points, 6.0 Contact hours |
| Placement | 6th Semester |
| Pre-requisites with regard to content | Internship |
| Pre-requisites according to the examination regulations | Modul Internship |
| Competences | The student should learn how a common, computer science-related content will be refurbished for a specific group of audiants. Additionnally he should have learned how to give his presentation and defend it. |
| Exams | Individual exams |
| Lecture Seminar | |
| Internal number | MKIB631 |
| Lecturer | Alle Dozenten |
| Scope | 6.0 ECTS points, 6.0 Contact hours 180 Stunden gesamt, davon 90 Stunden Kontaktstudium. |
| Type/mode | Seminar |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Homework 1 Semester (not graded) |
| Comments | |
| Lecture Presentation | |
| Internal number | MKIB632 |
| Lecturer | Alle Dozenten |
| Scope | 1.0 ECTS points, 0.0 Contact hours 30 Stunden gesamt, davon 0 Stunden Kontaktstudium. |
| Type/mode | Seminar |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Presentation 20 Min. (graded) |
| Comments | |

| Module Key Qualification | |
|---|---|
| Internal number | MKIB640 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 6.0 ECTS points, 6.0 Contact hours |
| Placement | 6th Semester |
| Pre-requisites with regard to content | Language Competence |
| Pre-requisites according to the examination regulations | Modul Internship, <= 4; siehe § 43-I/b (7) |
| Competences | The job marked has an increased demand for graduates with certain key skills. In the context of globalization the most important skills are the ability to communicate with people of other culture groups and basic knowledge of laws to write contract documents. The third important capability the students will learn is a good self-manifestation to present their work results in an optimal manner. |
| Exams | Individual exams |
| Lecture Intercultural Communication | |
| Internal number | MKIB641 |
| Lecturer | Prof. Dr. Andrea Cnyrim |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | <ul style="list-style-type: none"> - Central aspects of intercultural communication (e.g. cultural determined standards, behaviors, values, verbal and non verbal communication) with special interest in differences between object oriented cultures such as Germany and relationship-oriented cultures such as China and India - Influence of different cultural standards on international business relations (e.g. Business preparation, negotiations, personnel management, decision making, conflict resolution etc.) - Empirical investigations (e.g. Geert Hofstede, Fons Trompenaars etc.) - Case studies from different cultural areas (e.g. Germany, France, the USA, Japan, China, India etc.) |
| Recommended reading | |
| Exams | Exercise 1 Semester (not graded) |
| Comments | |
| Lecture Presentation techniques | |
| Internal number | MKIB642 |
| Lecturer | Prof. Dr. Michael Thiele |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |

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| Type/mode | Lecture |
| Language of instruction | German |
| Content | To exist in the political, social, economical and cultural living nowadays the students must be able to held speeches and to participate in discussions without stoppages. This seminar shows how to express oneself independently of a concrete text. |
| Recommended reading | PowerPoint slides |
| Exams | Verbal Exam 20 Min. (graded) |
| Comments | Lectures and practical exercises |
| Lecture Law | |
| Internal number | MKIB643 |
| Lecturer | RA Karin Raab |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | - Introduction to the right - That "Bürgerliches Gesetzbuch" (BGB) - The "Handelsgesetzbuch" (HGB) - The judicial procedure |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |

| Module Selected Chapters Computer Science/Media/Communication 1 | |
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| Internal number | MKIB650 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 6.0 ECTS points, 6.0 Contact hours |
| Placement | 6th Semester |
| Pre-requisites with regard to content | none |
| Pre-requisites according to the examination regulations | §43 (3) |
| Competences | The student should be able to lay his emphasis on individual interests. He can choose up to four subjects from the following list <ul style="list-style-type: none"> - Advanced Embedded Software - Business Intelligence - Graphical User Interfaces - Business Process Management - IT Consulting - Pattern Recognition - Network Security - Advanced ERP - Advanced Software Engineering |
| Exams | Individual exams |
| Lecture New Lecture | |
| Internal number | |
| Lecturer | Prof. Dr. Martin Sulzmann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture New Lecture | |
| Internal number | EITB622A |
| Lecturer | Prof. Dr. Christian Langen |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | |

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| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture HKA-APP | |
| Internal number | I W155 |
| Lecturers | M.Sc. Daniel Weisser Prof. Dr. Manfred Seifert |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | English |
| Content | |
| Recommended reading | |
| Exams | Hands-on Work 1 Semester (graded) |
| Comments | |
| Lecture Graphical-geometric algorithms | |
| Internal number | I W158 |
| Lecturer | Prof. Dr. Christian Pape |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture IT and media law | |
| Internal number | I W159 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture Augmented and virtual reality | |

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| Internal number | I W171 |
| Lecturer | Prof. Dr. Matthias Wölfel |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Business Intelligence | |
| Internal number | I W179 |
| Lecturer | Prof. Dr. Uwe Haneke |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <ul style="list-style-type: none"> - Introduction and business-management background - The concept of data warehousing - Business Analytics and Balanced Scorecard (BSC) - CRM and Data Mining - Trends in Business Intelligence-Case studies |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture ERP Special Chapters | |
| Internal number | I W182 |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Enterprise analysis, software choice, system integration, basics of customizing, small development task in ABAP in addition to an ABAP introduction, optional: project office: integrated project and service processing with SAP ECC 6.0 |
| Recommended reading | Lecture material completely as pdf documents, blackboard notes for interactive development of central problem positions, extensive material for every case study. |
| Exams | Written Exam 90 Min. (graded) |

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| Comments | Lecture, workshops, lab: Case study based participation in group oriented workshops about enterprise analysis, presentation of group results, independent implementation of the analysis results of into SAP by appropriate system customizing in the lab. Independent treatment of another lab task (e.g., ABAP course, case study project office) |
| Lecture IT Security | |
| Internal number | I W210 |
| Lecturers | Dipl. Inform. (FH) Georg Magschok Dipl. Inform. (FH) Michael Fischer |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Technological and topological mechanisms for securing networks, attack patterns and defense mechanisms against them. Basics of, variants of and defense against malicious software. Analysis and judgement of security mechanisms and related activities. Exercises at the end of each semester provide practical experience in dealing with security topics. |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Presentation with a lot of room for discussions and interaction. Finalized by a hands-on session. |
| Lecture Robotics | |
| Internal number | I W233 |
| Lecturer | Prof. Dr. Björn Hein |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture Advanced Embedded Software | |
| Internal number | I W300 |
| Lecturer | Prof. Dr. Dirk Hoffmann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Graphical User Interfaces | |
| Internal number | I W332 |
| Lecturer | B.Sc. Moritz Aleithe |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The lecture first deals with SWT/JFace and the Eclipse Rich Client Platform 4 (RCP), which uses SWT and JFace as its basis. The most important topics are the model-view-controller pattern, layout management and event handling using the observer pattern. Based upon this techniques advanced technologies like the separation of business logic and user interface code using data binding and dialog control are presented. Other topics are internationalization and multithreading in the context of user interfaces. The last part of the lecture shows the declarative construction of user interfaces and the application of the RCP framework. |
| Recommended reading | Books and Web sites: - Marc Teufel, "Eclipse 4", entwickler.press, Oktober 2012 - Lars Vogel, "Eclipse 4 Application Development", Mai 2012 - M. Marinilli, "Professional Java User Interfaces", Wiley & Sons, 2006 - R. Warner, R. Harris, "The Definite Guide to SWT and JFace", Apress, 2007 - M. Scarpino et.al., "SWT/JFace in Action", Manning Publications Co., 2005 - J. McAffer, J. M. Lemieux, "Eclipse Rich Client Platform", Addison-Wesley Longman (Pearson Education), 2010 - G. Wütherich, N. Hartmann, B. Kolb, M. Lübken, "Die OSGi Service Platform", dpunkt-Verlag, 2008 - http://www.ralfebert.de/rcpbuch/ - http://www.eclipse.org/swt/ - http://www.eclipse.org/articles/Article-UI-Guidelines/Index.html - http://www.eclipse.org/swt/snippets/ - http://wiki.eclipse.org/index.php/JFaceSnippets - http://www.java2s.com/ |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Lecture preparation, exam preparation, implementing the bonus exercise, 30% of the lecture is held as a computer exercise |
| Lecture Softwareengineering Special Chapters | |
| Internal number | I W342 |
| Lecturers | Prof. Dr. Thomas Fuchß M.Sc. Alexander Hasel |

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| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The course focuses on fundamental object-oriented design methods with an emphasis on design patterns and model driven concepts. The students learn to recognize, to know when to use, and to apply design patterns in varying situations in the context of an evolutionary development process. Furthermore the ability of an axiomatic rule base application of patterns, within a model driven approach, are discussed. |
| Recommended reading | Slides, textbooks, and other literature: Folien-Skript, Lehrbücher: - Gamma, Erich et. al. Entwurfsmuster: Elemente wiederverwendbarer objektorientierter Software - München : Addison-Wesley, 2001. - Buschmann, Frank. A system of patterns (Pattern-Oriented Software Architecture Volume 1) - John Wiley & Sons. 1996. - Schmidt, Douglas C. Patterns for concurrent and networked objects (Pattern-Oriented Software Architecture Volume 2) - John Wiley & Sons. 2000. - Michael Kircher, Prashant Jain. Patterns for Resource Management (Pattern-Oriented Software Architecture Volume 3) - John Wiley & Sons. 2004. - Frank Buschmann, Kevlin Henney, Douglas C. Schmidt. A Pattern Language for Distributed Computing (Pattern-Oriented Software Architecture Volume 4) - John Wiley & Sons. 2007. - Frank Buschmann, Kevlin Henney, Douglas C. Schmidt. On Patterns and Pattern Languages (Pattern-Oriented Software Architecture Volume 5) - John Wiley & Sons. 2007. - Fowler, Martin. Analysemuster: wiederverwendbare Objektmodelle: Ein Pattern-Katalog für Business-Anwendungen - Addison-Wesley-Longman. 1999. - OMG Object Management Group. Meta Object Facility (MOF) Specification - Version 2.4.1: OMG, 2011. |
| Exams | Verbal Exam/Concept 20 Min. (graded) |
| Comments | The lecture will take the form of seminars with exercises. |
| Lecture IT-Security Management | |
| Internal number | I W394 |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |

| Lecture IT Consulting | |
|---|---|
| Internal number | I W433 |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Consulting market, basic methods and analysis tools, peculiarities of IT consulting, basis types of case studies. |
| Recommended reading | Lecture material completely as pdf documents, blackboard notes for interactive development of central problem positions, instructions for interactive role play and case study material |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Participation lecture, development of an interactive role play in the group, individual execution of a short case study. |
| Lecture New Lecture | |
| Internal number | I W501 |
| Lecturer | Prof. Dr. Frank Schaefer |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W502 |
| Lecturer | Prof. Dr. Thomas Morgenstern |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Presentation 20 Min. (graded) |
| Comments | |
| Lecture Mathematics for Machine Learning | |
| Internal number | I W610 |

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|---|---|
| Lecturers | Prof. Dr.-Ing. Astrid Laubenheimer M.Sc. Ahmad Assani |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture Game Programming | |
| Internal number | I W620 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Computer Vision Laboratory | |
| Internal number | I W773 |
| Lecturer | Prof. Dr.-Ing. Astrid Laubenheimer |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Laboratory Work 1 Semester (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W779 |
| Lecturer | Prof. Dr. Zoltán Nochta |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | |
| Recommended reading | |
| Exams | Module exam |
| Comments | |
| Lecture Python frameworks | |
| Internal number | I W800 |
| Lecturer | Prof. Dr. Jürgen Zimmermann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Sound design | |
| Internal number | I W801 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Thesis |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 60 Min. (graded) |
| Comments | |
| Lecture Business Process Management | |
| Internal number | I W854 |
| Lecturer | Prof. Dr. Uwe Haneke |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <ul style="list-style-type: none"> - Defining a business process and types of business processes - Analyzing business processes - Modelling business processes - Tools for modelling business processes - Simulating business processes with ARENA - Enterprise SOA: SAP's vision of a service-oriented-architecture - KPI's for the evaluation of business processes |

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| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Databases Special Chapters | |
| Internal number | I W907 |
| Lecturer | M.Sc. Tobias Wink |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture SAP Certification | |
| Internal number | I W908 |
| Lecturers | M.Sc. Matthias Mruzek-Vering Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | <p>TERP10: SAP ERP - Integration of Business Processes is a 10-day training course held at the universities participating in the pilot project. The students learn how the fundamental integrative business processes in procurement, production, planning, project management, sales, customer service, asset management, financial accounting, human resources, and analytics interact within the SAP ERP application.</p> <p>The course provides students with a broad basic knowledge of the core business processes, business interrelations, and integration of business processes in SAP ERP.</p> <p>At the end of the course, students take a certification examination. If they pass the examination, they receive an SAP certificate, which is a fully recognized qualification in the industry.</p> |
| Recommended reading | course book |
| Exams | Written Exam 90 Min. (graded) |
| Comments | 10-day training: in the morning: theory in the evening: laboratory last day: SAP certification 3 hours multiple choice and multiple response questions |
| Lecture Serious Games | |

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| Internal number | I W910 |
| Lecturer | Prof. Daniel Schwarz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Model-based Software Development | |
| Internal number | I W911 |
| Lecturer | Prof. Dr. Martin Sulzmann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Formal Modelling Languages Synchronous languages (Lustre/SCADE) Temporal Specifications (LTL) Domain-specific Extensions Textual versus visual modelling Modeltransformation via internal DSLs Modelling guide lines Formal testing and verification Coverage criteria Testcasegeneration Static analysis and model-checking |
| Recommended reading | - lectures notes and slides - exercies - online references |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Prerequisistes: - UML Basics - C++, - Logic (propositional), - Lexer, Parser, EBNF (Compiler basics) Mix of lecture (2/3) and practical exercies/project work (1/3) |
| Lecture App Programming | |
| Internal number | I W912 |
| Lecturer | M.Sc. Adrian Wörle |

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| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The lecture teaches the construction of mobile media applications. The main concepts are discussed using the Android platform. In a first part, the basic technologies and limitations of mobile devices are shown. The second part examines different development strategies like native applications, device independent abstractions and web applications. A main part of the lecture is the integration of different media types into mobile applications and the constraints the developer has to keep in mind. |
| Recommended reading | will be announced |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Lecture with exercise |
| Lecture Cloud Computing | |
| Internal number | I W913 |
| Lecturers | Dipl. Inform. (FH) Michael Fischer Dipl. Inform. (FH) Georg Magschok |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | The buzzword "Cloud" represents a variety of interesting technologies which gained importance in the life of a computer science professional. Those are being collected, examined, explained and understood during the course. Primary objective is usefulness for the student, regardless of whether he acts as a cloud user, developer, administrator or even entrepreneur. Understand the broad meaning of "Cloud Computing" from a variety of perspectives: Definition, use cases, technology basics, key players, APIs, scaling, redundancy ... |
| Recommended reading | Powerpoint slides |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Mobile communication | |
| Internal number | I W914 |
| Lecturer | Prof. Dr. Oliver Waldhorst |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |

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| Exams | Verbal Exam 20 Min. (graded) |
| Comments | |
| Lecture Concept, Design und Presentation of interactive Projects | |
| Internal number | I W915 |
| Lecturer | Prof. Thomas Hinz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Homework 1 Semester (graded) |
| Comments | |
| Lecture CC Operation | |
| Internal number | I W917 |
| Lecturer | Dr. Günther Schreiner |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture In-memory Databases | |
| Internal number | I W920 |
| Lecturer | Prof. Dr. Zoltán Nochta |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Affective Computing | |
| Internal number | I W924 |

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| Lecturers | Prof. Thomas Hinz M.Sc. Bernd Dudzik |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Emotional expressions are important signals for people to make sense of situations, actions and relationships in their social interactions with each other. Is the empowerment of technological systems with the capacity to also sense and express emotions able to improve their users' interactions with them? This question is the driving force behind the field of Affective Computing. The students know different theories of emotions, contrast them with each other and debate them. They apply the acquired knowledge by addressing problems from within the primary areas of application for Affective Computing through the development of prototypical interactive systems that are capable of sensing or expressing emotions. |
| Recommended reading | Lecture notes, case studies. |
| Exams | Homework 1 Semester (graded) |
| Comments | |
| Lecture Video | |
| Internal number | I W925 |
| Lecturers | Marc Steinmetz Prof. Thomas Hinz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Homework 1 Semester (graded) |
| Comments | |
| Lecture Big Data Engineering | |
| Internal number | I W926 |
| Lecturer | Prof. Dr. Christian Zirpins |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |

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| Content | <p>The lecture Big Data Engineering addresses the systematic construction of data-intensive systems. Generic architectural approaches are introduced in order to design robust, performant and scalable data systems for various applications. For different architectural areas various kinds of data storage and processing models are discussed. Topics include, among others, distributed file systems, serialization, batch and stream processing with MapReduce and other programming models, queuing mechanisms and NoSQL databases. These are both conceptually described as well as implemented by means of exemplary tools and techniques. The focus is on established industry standards such as Apache Thrift, Hadoop, Kafka, Cassandra, Storm. These are illustrated by means of an exemplary Web Analytics application.</p> <p>During the course students acquire, among others, the following abilities:</p> <ul style="list-style-type: none"> - They evaluate different approaches of data systems for given application problems with specific requirements. - They describe structure and function of specific architectural approaches for Big Data systems. - They categorize tools and techniques for Big Data systems and utilize them professionally. - They design architecture and data models as well as processing logic and queries for given Big Data applications and implement these based on specific open source tools and techniques. |
| Recommended reading | <ul style="list-style-type: none"> - Nathan Marz, James Warren, "Big Data: Principles and best practices of scalable realtime data systems", Manning, 2015, ISBN: 1-617290-34-3 - Martin Kleppmann, "Designing Data-Intensive Applications", O'Reilly, 2014 (Early Release), ISBN: 978-1-4493-7332-0 - Tom White, "Hadoop: the definitive guide: storage and analysis at internet scale", 4. ed., O'Reilly, 2015, ISBN: 978-1-491-90163-2 - Michael Frampton, "Big Data Made Easy: A Working Guide to the Complete Hadoop Toolset", Apress, 2015, ISBN: 978-148-420-094-0 - Vivek Mishra, "Beginning Apache Cassandra Development", Apress, 2014, ISBN: 978-148-420-142-8 - Additional literature will be announced during the lecture |
| Exams | Written Exam 90 Min. (graded) |
| Comments | Independent work relates to the preparation and followup of lectures, laboratory exercises and exam preparation. |
| Lecture New Lecture | |
| Internal number | I W927 |
| Lecturer | Dr.-Ing. Wilfried Jakob |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |

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| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Digital Transformation & digital marketing | |
| Internal number | I W929 |
| Lecturers | Prof. Thomas Hinz Marc Steinmetz |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Homework 1 Semester (graded) |
| Comments | |
| Lecture Microservices | |
| Internal number | I W930 |
| Lecturer | Prof. Dr. Jürgen Zimmermann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W934 |
| Lecturer | Prof. Dr. Jürgen Zimmermann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture Microtechnology Laboratory | |
| Internal number | I W935 |

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| Lecturer | Prof. Dr. rer. nat. Oliver Schecker |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Hands-on Work 1 Semester (not graded) |
| Comments | |

| Module Selected Chapters Computer Science/Media/Communication 2 | |
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| Internal number | MKIB710 |
| Coordinator | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 8.0 ECTS points, 8.0 Contact hours |
| Placement | 7th Semester |
| Pre-requisites with regard to content | Internship Preparation and Roundup, Internship |
| Pre-requisites according to the examination regulations | §43 (4) |
| Competences | The student should be able to lay his emphasis on individual interests. He can choose up to four subjects from the following list <ul style="list-style-type: none"> - Autonomous Systems Lab - Multimedia Studies (Blended Learning) - Project Management - Quality Assurance - Teamteaching |
| Exams | Individual exams |
| Lecture Autonomous Systems Labor | |
| Internal number | I W276 |
| Lecturers | Dipl. Inf. (FH) Oktavian Gniot Prof. Dr. Norbert Link |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Project Lecture |
| Language of instruction | German |
| Content | Project 1: Implementation of an image-processing-based handling system, which performs transport activities on the basis of information extracted from a digital video camera Project 2: Implementation of the core functionality of an aircraft docking guidance system, which directs aircraft to their respective stopping position at the airport gate Project 3: Autonomous navigation, obstacle avoidance and object following with robots |
| Recommended reading | Lecture notes, task descriptions, project guidelines and FAQs, all accessible via the internet. Handbooks and relevant literature is available on site and for homework in the library. |
| Exams | Laboratory Work 1 Week (graded) |
| Comments | Theoretical familiarisation, practical work, reporting, partly as self-responsible work |
| Lecture Software Quality | |
| Internal number | I W392 |

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| Lecturer | Prof. Dr. Dirk Hoffmann |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | A database application for a flight reservation system is designed and prototypically implemented. This includes setting up a DB scheme, the design and testing of SQL queries, the use of transactions and transaction levels, as well as programming a seat reservation transaction with Java, JDBC and SQLJ-based on Oracle. |
| Recommended reading | Sample database, JUnit test cases, test-GUI; Textbooks: - "Grundlagen von Datenbanksystemen", Ausgabe Grundstudium (Taschenbuch) von Ramez Elmasri, Shamkant B. Navathe, Pearson, 2005, ISBN: 3827371538 - "Datenbanksysteme" von Alfons Kemper, Andre Eickler, Oldenbourg, 2006, ISBN: 3486576909 - "Datenbanken & Java. JDBC, SQLJ, ODMG und JDO" von Gunter Saake, Kai-Uwe Sattler, Dpunkt Verlag, 2003, ISBN: 3898642283 |
| Exams | Presentation 20 Min. (graded) |
| Comments | Supervised laboratory with final presentation on the computer, self-work, preparation and after working of lab sessions, prepare a report of the laboratory tasks. |
| Lecture New Lecture | |
| Internal number | I W393 |
| Lecturer | B.Sc. Michael Siebers |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Concept 1 Semester (graded) |
| Comments | |
| Lecture Project Management | |
| Internal number | I W422 |
| Lecturer | Prof. Dr. Uwe Haneke |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Project Lecture |
| Language of instruction | German |

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| Content | The lecture focuses mainly on practice oriented project management and new procedure models like Scrum. <ul style="list-style-type: none"> - Introduction to IT project management - Procedure models in IT project management - Defining a project - The project plan: the heart of the project - Getting started: Initialisation of the project - Project controlling - The final words: how to complete a project |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (graded) |
| Comments | |
| Lecture External selected chapter 1 | |
| Internal number | I W600 |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course is a placeholder for an external, graded course from another faculty or university. You must have the external subject approved before attending it. |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W600.a |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (graded) |
| Comments | |
| Lecture External selected chapter 2 | |
| Internal number | I W700 |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |

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| Type/mode | Lecture |
| Language of instruction | German |
| Content | This course is a placeholder for an external, graded course from another faculty or university. You must have the external subject approved before attending it. |
| Recommended reading | |
| Exams | Written Exam 90 Min. (not graded) |
| Comments | |
| Lecture Softwareengineering Special Chapters | |
| Internal number | I W701 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Seminar |
| Language of instruction | German |
| Content | The course focuses on fundamental object-oriented design methods with an emphasis on design patterns and model driven concepts. The students learn to recognize, to know when to use, and to apply design patterns in varying situations in the context of an evolutionary development process. Furthermore the ability of an axiomatic rule base application of patterns, within a model driven approach, are discussed. |
| Recommended reading | Slides, textbooks, and other literature: Folien-Skript, Lehrbücher: - Gamma, Erich et. al. Entwurfsmuster: Elemente wiederverwendbarer objektorientierter Software - München : Addison-Wesley, 2001. - Buschmann, Frank. A system of patterns (Pattern-Oriented Software Architecture Volume 1) - John Wiley & Sons. 1996. - Schmidt, Douglas C. Patterns for concurrent and networked objects (Pattern-Oriented Software Architecture Volume 2) - John Wiley & Sons. 2000. - Michael Kircher, Prashant Jain. Patterns for Resource Management (Pattern-Oriented Software Architecture Volume 3) - John Wiley & Sons. 2004. - Frank Buschmann, Kevlin Henney, Douglas C. Schmidt. A Pattern Language for Distributed Computing (Pattern-Oriented Software Architecture Volume 4) - John Wiley & Sons. 2007. - Frank Buschmann, Kevlin Henney, Douglas C. Schmidt. On Patterns and Pattern Languages (Pattern-Oriented Software Architecture Volume 5) - John Wiley & Sons. 2007. - Fowler, Martin. Analysemuster: wiederverwendbare Objektmodelle: Ein Pattern-Katalog für Business-Anwendungen - Addison-Wesley-Longman. 1999. - OMG Object Management Group. Meta Object Facility (MOF) Specification - Version 2.4.1: OMG, 2011. |
| Exams | Presentation 20 Min. (graded) |
| Comments | The lecture will take the form of seminars with exercises. |
| Lecture Teamteaching | |

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| Internal number | I W730 |
| Lecturers | Alle Dozenten Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Project Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (graded) |
| Comments | - Preparation of a tutorial, support of student groups - Organisation of events |
| Lecture Multimedia (Blended Learning) | |
| Internal number | I W774 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Project Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | Book: Henning, Taschenbuch Multimedia. |
| Exams | Online Test 4 Parts (graded) |
| Comments | |
| Lecture Social commitment | |
| Internal number | I W776 |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |

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| Content | <p>This course enables students to obtain ECTS credits for social work done at Karlsruhe University of Applied Sciences. The activity must be closely coordinated with a professor of the faculty. This can be, for example, support for the O-Phase or support for visually impaired students. In the case of the O-Phase, you will usually have to work on two semesters in order to achieve the required minimum number of hours.</p> <p>If you are interested, you can also obtain the "Certificate of International and Intercultural Competence (CIIC)". It certifies the intercultural competences and foreign language skills acquired during the degree programme, provides evidence of study-related experiences abroad and lists the framework in which the participants have been involved in intercultural activities. To earn the CIIC, you must cover three of four subject areas. The main component in subject area 1 is the voluntary commitment of at least 50 hours (about 2 hours per week in one semester), which can be completed in institutions or projects with an international and/or intercultural connection. In addition to the commitment, you will attend an introductory event as well as a reflection workshop and prepare an experience report, which is necessary to pass the subject area. If you have any questions about the certificate, please contact the Center of Competence: https://www.h-ka.de/ciic</p> <p>Through the Center of Competence, it is also possible to obtain the "Certificate for Social Engagement (ZGE)". It takes into account an even wider range of opportunities to get involved. Find your suitable area, whether it is community, social, cultural or ecological engagement. Your social engagement should comprise at least 100 time hours and last for at least one year. In addition to your commitment, you will attend various seminars from the Studium Generale (a total of 8 ECTS) to link your practical experience with theoretical knowledge. This certificate cannot be recognised as an elective subject. You can find more information here: https://www.h-ka.de/zge</p> <p>At regular intervals, the Center of Competence offers introductory events and reflection workshops for HKA students who are involved in voluntary work outside of their studies. This gives them the opportunity to exchange their experiences as volunteers with other participants and learn to reflect on and classify the insights they have gained. The next dates can be found on the CIIC website.</p> |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (not graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W777 |
| Lecturer | B.Sc. Tim Hänlein |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |

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| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Hands-on Work 1 Semester (graded) |
| Comments | |
| Lecture Seminar Digital Twin | |
| Internal number | I W778 |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 4.0 ECTS points, 4.0 Contact hours 120 Stunden gesamt, davon 60 Stunden Kontaktstudium. |
| Type/mode | Seminar |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written Exam 60 Min. (graded) |
| Comments | |
| Lecture High Performance Computing | |
| Internal number | I W909 |
| Lecturer | Prof. Dr. Britta Nestler |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Written/verbal Exam 90/20 Min. (graded) |
| Comments | |
| Lecture ABAP Programming | |
| Internal number | I W918 |
| Lecturer | Prof. Dr. rer. pol. Mathias Philipp |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | German |
| Content | Einführung in die Programmiersprache ABAP mit praktischen Übungen im SAP NetWeaver Application Server ABAP. Die Studenten sollen Sprachelemente, Workbench, Datenbank, Selektionsbilder, Funktionsbausteine und ABAP OO kennen lernen und eigenständig auf neue Fragestellungen anwenden können. |

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| Recommended reading | Vorlesungsmaterial vollständig in PowerPoint-Folien, Tafelaufschrieb bei interaktiver Erarbeitung von Kernproblemstellungen, Übungsblätter und selbständige praktische Übungen am SAP System. |
| Exams | Module exam |
| Comments | Seminaristischer Unterricht mit hohem Laboranteil |
| Lecture Game AI | |
| Internal number | I W923 |
| Lecturers | Dr. Patrick Glauner Prof. Dr.-Ing. Astrid Laubenheimer |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Lecture |
| Language of instruction | English |
| Content | |
| Recommended reading | |
| Exams | Written Exam 90 Min. (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I W936 |
| Lecturer | Prof. Dr.-Ing. Holger Vogelsang |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Hands-on Work 1 Semester (graded) |
| Comments | |
| Lecture New Lecture | |
| Internal number | I Wxx2 |
| Lecturer | Prof. Dr. Peter Henning |
| Scope | 2.0 ECTS points, 2.0 Contact hours 60 Stunden gesamt, davon 30 Stunden Kontaktstudium. |
| Type/mode | Laboratory Course |
| Language of instruction | German |
| Content | |
| Recommended reading | |
| Exams | Exercise 1 Semester (graded) |
| Comments | |

| Module Scientific Working | |
|---|---|
| Internal number | MKIB720 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 5.0 ECTS points, 3.0 Contact hours |
| Placement | 7th Semester |
| Pre-requisites with regard to content | Student Research Project, Key Qualification |
| Pre-requisites according to the examination regulations | §43 (4) |
| Competences | Students learn the importance of a method-based approach in computer science and the basic principles of computer science research. To this end, they search specifically for suitable scientific literature and understand how to read it and how it can be used for their own work (research, evaluate, cite). They are then able to write their own scientific paper (topic formulation, problem definition, objectives, structuring and organisation, quality assurance) with confidence. |
| Exams | Individual exams |
| Lecture Scientific Working | |
| Internal number | MKIB721 |
| Lecturer | Alle Dozenten |
| Scope | 5.0 ECTS points, 3.0 Contact hours 150 Stunden gesamt, davon 45 Stunden Kontaktstudium. |
| Type/mode | Hands-on Experience |
| Language of instruction | German |
| Content | |
| Recommended reading | - "Informatik-Handbuch" von Peter Rechenberg, Gustav Pomberger, Hanser Fachbuch, 2006, ISBN: 3446218424 - "Die schriftliche Arbeit - kurz gefasst" von Jürg Niederhauser, Bibliographisches Institut, Mannheim, 2006, ISBN: 3411042346 |
| Exams | Exercise 1 Month (not graded) |
| Comments | |

| Module Thesis | |
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| Internal number | MKIB730 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 12.0 ECTS points, 0.0 Contact hours |
| Placement | 7th Semester |
| Pre-requisites with regard to content | System Software and System Programming, Business Administration, Computer Graphics, Databases and Communication Networks 1, Databases and Communication Networks 2, ERP Systems, Embedded Software, Computer Science 1, Computer Science 2, Communication Competence, Mathematics 1, Mathematics 2, Media Design, Media Project, Man-Machine-Communication 1, Man-Machine-Communication 2, Internship, Internship Preparation and Roundup, Student Research Project, Key Qualification, Software Engineering and Distributed Systems 2, Software Laboratory, Language Competence, Computer Engineering, Technologies of the Internet, Theoretical Computer Science, Scientific Working |
| Pre-requisites according to the examination regulations | Modul Internship, <= 4; siehe § 43-I/b (7); Min. 120 CP aus dem Hauptstudium |
| Competences | Students are able to work independently on a practical problem or research task within a specified period of time using scientific methods and knowledge of the subject. They structure the task, check the dependencies, compile the necessary resources and work on the task according to a timetable. The results of the work can then be presented to a specialised audience and used for further work. |
| Exams | Individual exams |
| Lecture Thesis | |
| Internal number | MKIB731 |
| Lecturer | Alle Professoren |
| Scope | 12.0 ECTS points, 0.0 Contact hours 360 Stunden gesamt, davon 0 Stunden Kontaktstudium. |
| Type/mode | Thesis |
| Language of instruction | German |
| Content | In the final thesis, students work independently on a practical problem or research task within a specified period of time using scientific methods and knowledge of the subject. They structure the task, compile the necessary resources and work on the problem according to a timetable. They are then able to present the results of their work. |
| Recommended reading | |
| Exams | Bachelor Thesis 4 Months (graded) |
| Comments | All work will be individual work and will include basic literature research, system analysis, coding, documentation, and oral presentation. |

| Module Final examination | |
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| Internal number | MKIB740 |
| Coordinator | Prof. Dr. Heiko Körner |
| Scope | 3.0 ECTS points, 0.0 Contact hours |
| Placement | 7th Semester |
| Pre-requisites with regard to content | Computer Science 2, Communication Competence, Mathematics 1, Mathematics 2, Media Design, Media Project, Man-Machine-Communication 1, Man-Machine-Communication 2, Internship, Internship Preparation and Roundup, Student Research Project, Key Qualification, Software Engineering and Distributed Systems 2, Software Laboratory, Language Competence, Computer Engineering, Technologies of the Internet, Theoretical Computer Science, Scientific Working, Thesis, System Software and System Programming, Business Administration, Computer Graphics, Databases and Communication Networks 1, Databases and Communication Networks 2, ERP Systems, Embedded Software, Computer Science 1 |
| Pre-requisites according to the examination regulations | Modul Internship |
| Competences | Students convincingly present the findings and results achieved within a specialised, application-related piece of work to a knowledgeable audience. They evaluate the content of such work, select the key aspects and present them in a didactically meaningful way. The specialised audience can thus take away the most important added value of the work and use it for their own work. |
| Exams | Individual exams |
| Lecture Final examination | |
| Internal number | MKIB741 |
| Lecturer | Alle Professoren |
| Scope | 3.0 ECTS points, 0.0 Contact hours 90 Stunden gesamt, davon 0 Stunden Kontaktstudium. |
| Type/mode | Colloquium |
| Language of instruction | German |
| Content | The final examination covers all topics relevant to computer science in the main study programme. Students demonstrate that they have understood and can apply interdisciplinary contexts. They answer questions from various areas of media informatics that are related to their final thesis. With the final examination, they demonstrate that they have the competence to independently work on novel problems in the field of media informatics. |
| Recommended reading | |
| Exams | Verbal Exam 20 Min. (not graded) |
| Comments | |