
Modulhandbuch

Computing Science - Master of Education Programme (Vocational and Business Education)

im Sommersemester 2018

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Pflichtbereich

inf005 - Software Engineering I

Module label	Software Engineering I
Modulkürzel	inf005
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum - Pflichtbereich • Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich • Master's Programme Environmental Modelling (Master) > Mastermodule
Zuständige Personen	• Winter, Andreas (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	• inf030 • inf031
Skills to be acquired in this module	The objective of the module is to convey the development and maintainance of large scale software systems. The complete software developing process including requirements collection, software architecture and quality control is observed. The basics of object oriented modelling and software development are enhanced. Professional competence The students: • comprehend the different developmental phases of software (especially requirements engineering, software design, software implementation and quality control) • name the tasks of each phase • select appropriate methodical utilities • select suitable methods and utilities for each project phase • understand the advantages of the modelling process with UML • model moderate tasks in UML • understand and develop solutions for given problems by means of development environments Methodological competence The students: • structure, document and evaluate problems and solutions with the tools of object oriented modelling • apply methods and techniques of object oriented modelling purposefully Social competence The students: • create, present and discuss solutions with modelling techniques - • present and solve modelling problems in teams Self-competence The students: reflect their problem-solving behaviour with regard to the capabilities of software technology
Module contents	The module introduces fundamental terms and concepts in software engineering. This includes: • need for software engineering • activities and process-models in software development • object-oriented modelling, meta modelling

- Interdependencies between code and models
- requirements elicitation
- definition of software architectures
- application of software patterns
- software quality management
- software maintenance, evolution and operation Software engineering tools are presented and applied in practical exercises.

Literaturempfehlungen

- Slide script for the lecture
- Ian Sommerville: Software Engineering, Addison-Wesley Longman, Amsterdam, 10. Ed. 2012
- Jochen Ludewig, Horst Lichter: Software Engineering, dpunkt.verlag, 3. Auflage 2013
- Helmut Balzert: Lehrbuch der Software-Technik, Spektrum Akademischer Verlag, 3. Auflage 2009
- Chris Rupp, Stefan Queins: UML 2 glasklar. Praxiswissen für die UML-Modellierung, Carl Hanser Verlag, 4. Auflage 2012

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		- inf030 - inf031		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture period or during the lecture period (portfolio)	Written exam or oral exam or portfolio (? 3 services)	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				70 h

inf007 - Information Systems I

Module label	Information Systems I
Modulkürzel	inf007
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum - Pflichtbereich • Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule • Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule (60 KP) • Master Applied Economics and Data Science (Master) > Specialization • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich
Zuständige Personen	• Wingerath, Wolfram (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	This module introduces the core concepts, languages and architectures of databases. In software systems these concepts are important. Professional competence The students: • name the core concepts of the languages and architectures of databases (especially) • select data models • integrate structuring concepts of information systems in their designs Methodological competence The students: • design database systems appropriatelyanalyse problems from the field of database-supported • information systems and solve them appropriately Social competence The students: • enhance their ability to work in a team Self-competence The students: • reflect their problem-solving behaviour with regard to the information processing concepts
Module contents	• Relational data models • Relational algebra and its implementation in SQL (the standard of databases) • Database design on different abstractions (conceptual and logical design) • Normalisation - Data base architectures • Distributed and active databases • Object-oriented, object-related and XML-based database systems
Literatureempfehlungen	• Ramez Elmasri und Shamkant B. Navathe (2016), Fundamentals of Databases Systems, 7th Revised edition, Pearson/Addison Wesley.
Links	
Language of instruction	German

Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture period	Written or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

inf600 - Business Informatics I

Module label	Business Informatics I
Modulkürzel	inf600
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Basiscurriculum • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik • Bachelor's Programme Sustainability Economics (Bachelor) > Wahlpflichtbereich • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Angewandte Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich
Zuständige Personen	• Sauer, Jürgen (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements
Skills to be acquired in this module	Business informatics regards itself as an interdisciplinary subject. It connects business administration with computer science. Business informatics also includes information technologies as well as technical subjects and research topics. It is more than just an intersection of research fields and offers e.g. special methods to coordinate corporate strategies and information processing. The module introduces the entire scope of the field of business informatics. Professional competence The students: • describe the key aspects of business informatics • differentiate business informatics as an interdisciplinary subject from other subjects • characterise the functionality of essential application systems and management structures, from the strategical to the tactical and operative level. • consider and evaluate case studies and layout options for the conception, development, implementation, usage and maintenance of operational sociotechnical applications systems Methodological competence The students: • model technical and sociotechnical processes using suitable tools • analyse business processes and the demands on their modification and their technical assistance • abstract from complex systems in a suitable way to improve the manageability of models Social competence The students: • present their solutions in front of other groups • discuss their outcomes Self-competence The students: • develop solutions for case studies in groups • construct an argument based on aquired knowledge
Module contents	

The main topics of business informatics are the presentation and evaluation of configuration options to conceptualise, develop, implement, use and maintain operational sociotechnical application systems. The lecture focusses on information systems of the networked company. Technical, economic, organisational, and psychosocial aspects are considered. The understanding of these relations will be trained by means of case studies taken from Laudon et al. (cf. suggested reading).

The lecture gives an overview of the following business informatics fields:

- Information systems, (object of BI)
- Application systems
- E-Commerce and E-Business
- Ethical, social and political aspects
- Business process integration
- Knowledge management
- Support of decision making
- Reorganisation of companies
- Economic evaluation For a better understanding of each subject, it is recommended to take specific modules later in the course of studies.

Literatureempfehlungen

- Laudon, Laudon, Schoder (2006): Wirtschaftsinformatik. Eine Einführung. Pearson Verlag Krallmann,
- Frank, Gronau (2002), Systemanalyse im Unternehmen Oldenbourg (Gebundene Ausgabe - Juni 2002)

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		every winter term		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		none		
Examination	Prüfungszeiten		Type of examination	
Final exam of module				
	At the end of the lecture period		Tasks and active partaking during the exercises / written exam or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

inf701 - Computer Science Education II

Module label	Computer Science Education II
Modulkürzel	inf701
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich • Master's Programme Computing Science (Master) > Angewandte Informatik
Zuständige Personen	• Diethelm, Ira (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements

Skills to be acquired in this module

Professional competence
The students:

- (re-)construct the knowledge of computer science by the method of didactical reduction
- differentiate the development of computer science and evaluate this development with current trends for class
- select computer science education approaches for lesson planning, organisation and implementation

Methodological competence
The students:

- (re-)construct core concepts of lesson planning for computer science education requirements

Social competence
The students:

- present self-developed lesson plans and lesson materials
- discuss lesson plans regarding computer science education concepts
- accept opinions and criticism
- provide constructive feedback

Self-competence
The students:

- adapt computer science education concepts for lesson planning
- reflect on their self-perception with regard to the conception of computer science education

Module contents

The lecture will focus on the requirements and challenges of computer science education in grammar school (German: Gymnasium).

Main focus:

- Didactical (re-)construction of computer science knowledge, especially its didactical reduction
- Didactical categorisation of computer science and the development, importance and evaluation of computer science in school
- Scheduling, organisation and implementation of computer science in class

Literaturempfehlungen

- Humbert, Ludger: Didaktik der Informatik. Wiesbaden: B. G. Teubner,

2005

- Weitere Literatur wird in der Veranstaltung je nach thematischen Schwerpunkten bekannt gegeben

Links	<!HTML> http://elearning.uni-oldenburg.de	
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	annual	
Module capacity	unlimited	
Teaching/Learning method	S	
Previous knowledge	none	

Examination	Prüfungszeiten	Type of examination
Final exam of module	End of lecture period	Exercise and und 1 seminar paper or 1 oral exam

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2	WiSe	56
Exercises		2	WiSe	0
Präsenzzeit Modul insgesamt				56 h

inf712 - Current Topics in Computer Science Education I

Module label	Current Topics in Computer Science Education I
Modulkürzel	inf712
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich • Master's Programme Computing Science (Master) > Angewandte Informatik
Zuständige Personen	• Diethelm, Ira (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements
Skills to be acquired in this module	This module integrates current developments in the field in adequate study courses. Professional competences The students: • define and contrast a computer science part, in which they are specialised, in detail or evaluate computer science in general • recognise and evaluate applied techniques and methods of their subject and are aware of their limits • identify, structure and solve problems/tasks, also in new or developing subject areas • apply state of the art and innovative methods to solve problems, if necessary from other disciplines • are aware of the current limits and contribute to the development of computer science research and technology • discuss and evaluate recent computer science developments Methodological competences The students: • examine tasks with technical and research literature, write an academic article and present their solutions academically • evaluate problems/tasks, including new or developing subject areas of their discipline and apply computer science methods for solutions and research • schedule time processes and resources Social competences The students: • communicate with users and experts convincingly Self-competences The students: • pursue the overall and special computer science development critically • develop and reflect self-developed hypotheses to theories independently
Module contents	See assigned course description
Literatureempfehlungen	As announced in course

Links

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	irregular
Module capacity	unlimited
Teaching/Learning method	V or S
Previous knowledge	none

Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture period	Written exam or portfolio or presentation or oral exam

Lehrveranstaltungsform	Course or seminar
SWS	2
Frequency	siehe Angebotsrhythmus Modul
Workload Präsenzzeit	28 h

Recht und Gesellschaft

inf851 - Computer Science and Society

Module label	Computer Science and Society
Modulkürzel	inf851
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	

- Bachelor's Programme Biology (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Business Administration and Law (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Business Informatics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Business Informatics (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft
- Bachelor's Programme Chemistry (Bachelor) > Säule "Überfachliche Professionalisierung" more...
- Bachelor's Programme Comparative and European Law (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Computing Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Computing Science (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft
- Bachelor's Programme Economics and Business Administration (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik
- Bachelor's Programme Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Engineering Physics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Environmental Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Physics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Social Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Sustainability Economics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Art and Media (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Biology (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Dutch Linguistics and Literary Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Economic Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Economics and Business Administration (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Elementary Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme English Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Gender Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme General Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme German Studies (Bachelor) >

	Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme History (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-subject bachelor's programme Low German (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Material Culture: Textiles (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Music (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Physics (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Social Studies (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Sport Science (Bachelor) > Säule "Überfachliche Professionalisierung" • Dual-Subject Bachelor's Programme Technology (Bachelor) > Säule "Überfachliche Professionalisierung" • Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > Säule "Überfachliche Professionalisierung" • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Recht und Gesellschaft
Zuständige Personen	• Lehrenden, Die im Modul (Prüfungsberechtigt) • Dittert, Nadine (module responsibility)
Prerequisites	no participant requirements
Skills to be acquired in this module	Graduates of the module Informatik und Gesellschaft know the history of the development of Information technology and its impact on society and are familiar with issues of data protection. They will be able, individually or in a team, to analyze the ethical and socio-political implications of different areas and applications of computer science and develop a reasoned own position on this, in particular concerning their professional responsibilities as computer scientists. They have learned to present the results of their work convincingly and suitable for their target group using appropriate media and they are able to organize events such as workshops or small conferences for that purpose. Professional competence The students: • reflect on the ethical and societal aspects of selected areas of computer science • create and design websites • create and manage documents in a team Methodological competence The students: • explore methods of structured teamwork • organize project work • make presentations with different media Social competence The students: • develop a subject area as a team • teach a bigger audience to appreciate their knowledge • discuss their observations and opinions with others Self-competence The students: • reflect their role in a team • reflect their role as computer scientists in society

Module contents

In brief, topics like the following are covered:

- Computer Crime
- Computer Games
- Data Protection
- Electronic Democracy
- Ethics in Computer Science
- History of Information Technology
- Use of information technology at school
- Internet - integration or division of society?
- Artificial Intelligence
- Manipulation by War Games
- Open Source Software
- Robots in Society
- Trustworthy Systems

Literatureempfehlungen

- See reference books Informatik und Gesellschaft in BIS.
- Joseph Weizenbaum, 2001: Die Macht der Computer und die Ohnmacht der Vernunft.
- H. Klaeren u.a., (Eds.), 1999: Tübinger Studentexte Informatik und Gesellschaft. Universität Tübingen.
- J. Friedrich, Th. Herrmann, M. Peschek, A. Rolf (Hrsg.), 1995: Informatik und Gesellschaft. Spektrum.

Links		https://uol.de/iug		
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Reference text		The topics for the teams are assigned during the first week of the semester		
Teaching/Learning method		1VL + 1S		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		During semester and at the end	Portfolio (5-6 partial performances)	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Seminar		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

wir806 - Information Technology Law

Module label	Information Technology Law	
Modulkürzel	wir806	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft • Bachelor's Programme Computing Science (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft • Master Applied Economics and Data Science (Master) > Specialization • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule more... • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Recht und Gesellschaft • Master's programme Business Administration: Management and Law (Master) > Basismodule • Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - Recht • Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master) • Master's Programme Computing Science (Master) > Module aus anderen Studiengängen	
Zuständige Personen	• Rott, Peter (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt) • Rott, Peter (Module counselling)	
Prerequisites	not applicable	
Skills to be acquired in this module	The students are familiar with the effects of digitalisation with its chances and risks in European and German private law and, in particular, consumer law. They obtain knowledge of specific areas of digitalised private law and consumer law with particular relevance for their future professional practice, are able to solve consumer law cases in a goal-oriented way, are able to find approaches for legal problems as well as recognise liability risks and how to deal with them, and are, in contract negotiations, able to recognise the requirements for regulation and to evaluate its consequences	
Module contents	This module conveys how new technologies impact on private law and, in particular, on consumer law. It focuses on the (modified) interpretation of existing laws but even more on the reactions of the EU and national legislators and of the judiciary to new technological developments. The module discusses, among others, distance selling law, digitalised sales law and product liability law, the law of digital content and digital services, unfair commercial practices on internet and the law of the platform economy. Finally, the module looks at enforcement.	
Literatureempfehlungen	to be announced in the first lecture	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	unlimited	
Type of module	Wahlpflicht / Elective	
Module level	MM (Mastermodul / Master module)	
Teaching/Learning method	Lecture and Seminar	
Previous knowledge	basic knowledge of civil law is helpful.	
Examination	Prüfungszeiten	Type of examination
Final exam of module	to be taken from the examination regulations	

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		2		28
Präsenzzeit Modul insgesamt				56 h

Praktische Vertiefung der Informatik

inf009 - Database Practical

Module label	Database Practical
Modulkürzel	inf009
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Grawunder, Marco (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	• Information Systems I • Operating system knowledge
Skills to be acquired in this module	The objective of this module is to gather practical experience on databases and information systems. The students get an overview of the technical realisation, implementation and optimisation of a professional database management system. Professional competence The students: • Realise, implement and program data base systems • Program and implement database-oriented system routines • Implement optimisation goals in the modelling phase • Administer professional database systems (installation, maintenance and adjustment) • Recognise database systems' performance problems and are able to fix them with according methods • Organise and control processes of database systems Methodological competence The students: • propose concrete processing principles for special application classes • reflect on specific technologies and procedures with regard to their consequences Social competence The students: • Solve database system problems in a team Self-competence The students: • Acknowledge the limits of their ability to cope with pressure during the implementation and are aware of failures • Reflect their self-perception
Module contents	The module "Practical Course Databases" is a related practical course of the module "Information Systems I". The objectives of this module are special technical concepts of a database system and practical solutions in database programming and optimisation. Contents of this module are:

- System-oriented database management programming,
- Implementation of catalogue systems,
- Optimisation strategies based on parallelisation and partitioning requirements

Literaturempfehlungen

- Ramez Elmasri und Shamkant B. Navathe (2007). Fundamentals of Databases Systems. Fifth Edition, Pearson/Addison Wesley
- Held Andrea (2005), Oracle 10g Hochverfügbarkeit Addison-Wesley -
- Held Andrea (2015), Oracle 12c New Features Addison Wesley
- Feuerstein Steven, Pribyl Bill, Dawes Chip (2007). Oracle PL/SQL. 4. Auflage, O'Reillys Taschenbibliothek

Links	http://www-is.informatik.uni-oldenburg.de/227/	
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	every winter term	
Module capacity	unlimited	
Teaching/Learning method	P	
Previous knowledge	Information Systems I Operating system knowledge	
Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture period	Oral exam
Lehrveranstaltungsform	Exercises	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

inf014 - Operating Systems Practical

Module label	Operating Systems Practical
Modulkürzel	inf014
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Theel, Oliver (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	• Information Systems I • Operating Systems I- Operating Systems II • Programming languages: C, Assembler
Skills to be acquired in this module	The aim of this module is to get practical experience in the field of analysis, design, and implementation methods of components of operating systems and their interactions. Professional competence The students: • familiarise with complex software systems • implement hardware-related components of operating systems • describe parallel system operation executions • understand the basic concepts of the programming language C++ • identify software errors systematically, especially regarding parallel software • work in teams • use UNIX standard software to solve problems • recognise the advantage of working with virtual machines Methodological competence The students: • are aware of the challenges in handling operating systems • transfer operating system concepts to a practical context • analyse different solutions to a problem wrt. their properties • select the most suitable solution Social competence The students: • solve problems in small teams • present their solutions to all teams • discuss their different solutions within their own team and among all teams Self-competence The students: • accept criticism • organise the workflows within their teams • question their potential solutions in the light of criticism received • identify own shortcomings in their initial ability to successfully transfer theory to praxis
Module contents	The contents of this module are: • Analysis of a rudimentary operating system • Design and implementation of a process management subsystem • Design and implementation of process synchronisation mechanisms • Design and implementation of a virtual memory management subsystem • Design and implementation of a file subsystem or dialog subsystem

Literaturempfehlungen

- Patterson and Hennessy, Computer Organization and Design, 3rd edition, Morgan Kaufmann, 2007

Links

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	every winter term
Module capacity	unlimited
Reference text	Associated with the modules: • Operating Systems I • Operating Systems II • Distributed Systems

Teaching/Learning method		P
Previous knowledge		- Operating Systems I - Operating Systems II - Programming languages: C, Assembler
Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the semester	Active participation / work report and oral exam
Lehrveranstaltungsform	Practical training	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

inf018 - Media Processing

Module label	Media Processing
Modulkürzel	inf018
Credit points	6.0 KP
Workload	180 h

Verwendbarkeit des Moduls

- Bachelor's Programme Biology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Business Administration and Law (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik
- Bachelor's Programme Business Informatics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Chemistry (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer" more...
- Bachelor's Programme Comparative and European Law (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik
- Bachelor's Programme Computing Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Economics and Business Administration (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Engineering Physics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Environmental Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Physics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Social Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Sustainability Economics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Art and Media (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Biology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Chemistry (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP)
- Dual-Subject Bachelor's Programme Dutch Linguistics and Literary Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Economic Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Economics and Business Administration (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Elementary Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme English Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"

- Dual-Subject Bachelor's Programme Gender Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme General Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme German Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme History (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-subject bachelor's programme Low German (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Material Culture: Textiles (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Music (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Physics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Social Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Sport Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Technology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik)
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik

Zuständige Personen

- Boll-Westermann, Susanne (module responsibility)
- Lehrenden, Die im Modul (Prüfungsberechtigt)

Prerequisites

Solid programming skills in Java and/or C++, practical informatics. Interest in media processing

Skills to be acquired in this module

The students can explain the basics of image processing and know which algorithms exist for the basic tasks in image processing and how these are applied.

The students can apply basic methods of image processing they learned in the lecture to solve simple problems.

Professional competence:

The students

- can name basic characteristics of digital media
- can explain the most common methods for encoding and compressing images, video and audio
- can describe basic procedures for image enhancement, feature extraction, feature description, image analysis and image comprehension

Methodological competence:

The students

- can recognize and evaluate image properties and decide for suitable image processing methods
- can select existing software packages for simple image processing problems, as well as use and customize them for their specific task
- can implement simple image and media processing functions in a higher programming language (e.g., C ++)

Social competence

The students:

- can plan, implement, and document a software project in team work
- can present the results of their work to an audience and adequately respond to criticism and questions

Self competence

The students:

- can accept and learn from mistakes made during the process of implementation

Module contents

The lecture covers the technologies of media processing. In particular, the lecture focuses on image processing chain from digital imaging, through image pre-/and postprocessing, and image storage to image analysis. In addition to compression techniques and color space theory (RGB, HSV, YUV, CIEXYZ, ...), the topics of the lecture include image enhancement, feature extraction, feature description, image analysis and image comprehension. The lecture furthermore discusses the encoding and analysis of video and audio.

Literaturempfehlungen

- Wilhelm Burger und Mark James Burge. Digitale Bildverarbeitung: Eine Einführung mit Java und Image, J. Springer, 2006.
- Literatur im Handapparat der Abteilung in der Bibliothek.
- Linkliste im Lernmanagementsystem zu den einzelnen Themen der Vorlesung.

Links	https://uol.de/en/media-informatics/teaching/courses
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	every winter term
Module capacity	12
Reference text	
Teaching/Learning method	V+Ü
Previous knowledge	Solid programming skills in Java and/or C++, practical informatics. Interest in media processing

Examination	Prüfungszeiten	Type of examination
Final exam of module	The presentation of the practical project on a project day of all small groups takes place directly after the lecture period. The oral examination takes place in the first two weeks after the end of the lecture period. Any post-examinations will take place at the end of the lecture period. The exact schedule can be found on the department's web pages as well as the information in the learning management system Stud.IP.	Project and oral Exam or project and written exam

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

inf021 - Advanced Java Technologies

Module label	Advanced Java Technologies
Modulkürzel	inf021
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Boles, Dietrich (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	useful knowledge: Object-oriented programming
Skills to be acquired in this module	The objective of this module is to introduce advanced concepts and technologies of the Java Standard Edition. The students will be able to use the technologies to implement large applications. Professional competence: The students: • name the essential packages of the JDK class library • structure large programs properly and implement them extensively • set up own Java class libraries • look up required classes in the JDK-Library and solve problems with these classes • structure their programs properly • understand and interpret large programs of other students • evaluate the quality of large programs related to their maintainability, reuseability and expandability Methodological competence: The students: • search for solutions to specific problems in the internet independently Social competence: The students: • discuss own and solutions of other students Self-competence: The students: • reflect their problem-solving behaviour and take up new solutions, e.g. from the internet

Module contents

A selection of the following subjects is presented during the lectures:

- GUI (AWT, Swing, JavaFX)
- Java-Basics and Collection-API
- Graphics and multimedia
- Events
- Model-View-Control (MVC)
- Threads
- Internationalization, localization
- Reflection
- IO, Files
- Tools (compiler, classloader, printer, ...)
- Storage technologies (XML and serialization)
- Distributed programming (sockets and RMI)
- Databases (JDBC)
- Compression
- Security concepts

Alternatively, a single topic is explored in depth.
As part of the exercises, individual programming tasks or a larger programming task will be worked on. The tasks are related to the topic of the individual lecture contents.

Literaturempfehlungen		list of links in the learning management system		
Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		every semester		
Module capacity		12		
Reference text				
Teaching/Learning method		V+Ü		
Previous knowledge		Object-oriented programming		
Examination	Prüfungszeiten	Type of examination		
Final exam of module	throughout the semester	practical exercises		
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe oder WiSe	56
Exercises		2	SoSe oder WiSe	28
Präsenzzeit Modul insgesamt				84 h

inf202 - Computer Engineering Practical

Module label	Computer Engineering Practical
Modulkürzel	inf202
Credit points	6.0 KP
Workload	180 h

Verwendbarkeit des Moduls

- Bachelor's Programme Biology (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Business Administration and Law (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Business Informatics (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Chemistry (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Comparative and European Law (Bachelor) > Fachnahe Angebote Informatik more...
- Bachelor's Programme Computing Science (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Economics and Business Administration (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Education (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Engineering Physics (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Environmental Science (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Physics (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Social Studies (Bachelor) > Fachnahe Angebote Informatik
- Bachelor's Programme Sustainability Economics (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Art and Media (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Biology (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP)
- Dual-Subject Bachelor's Programme Dutch Linguistics and Literary Studies (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Economic Education (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Economics and Business Administration (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Education (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Elementary Mathematics (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme English Studies (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Gender Studies (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme General Education (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme German Studies (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme History (Bachelor) > Fachnahe Angebote Informatik
- Dual-subject bachelor's programme Low German (Bachelor) > Fachnahe Angebote Informatik
- Dual-Subject Bachelor's Programme Material Culture: Textiles (Bachelor) > Fachnahe Angebote Informatik

	• Dual-Subject Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Music (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Physics (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Social Studies (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Sport Science (Bachelor) > Fachnahe Angebote Informatik • Dual-Subject Bachelor's Programme Technology (Bachelor) > Fachnahe Angebote Informatik • Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > Fachnahe Angebote Informatik • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Technische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Fränzle, Martin Georg (module responsibility) • Janßen, Detlef (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	Recommendation: inf200 "Fundamentals of Computer Engineering"
Skills to be acquired in this module	This course enables students to analyze information technology systems, understand individual components of computers, design and optimize them, and discuss domain-specific hardware design in a qualified manner. Professional competences The students • describe individual components of computers • design and optimize individual components of computers • design and optimize automata specify and imply autonomous systems Methodological competence The students • synthesize computer architectures • can transfer methods of hardware design to different systems Social competence The students • discuss hardware in a qualified manner Self-competence The students • are able to clearly distinguish their level of knowledge from professionals of related disciplines
Module contents	This module is the practical part of the course Introduction to Computer Engineering.
Literatureempfehlungen	• Script for the course • Patterson, D.A., Hennesy, J.L.: Computer Organisation and Design: The Hardware/Software Interface
Links	
Language of instruction	German

Duration (semesters)		1 Semester
Module frequency		every summer term
Module capacity		unlimited
Teaching/Learning method		1 P
Previous knowledge		Recommendation: inf200 Fundamentals of Computer Engineering
Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture term	Portfolio
Lehrveranstaltungsform	Practical training	
SWS	4	
Frequency	SoSe	
Workload Präsenzzeit	56 h	

inf800 - Proseminar in Computer Science

Module label	Proseminar in Computer Science
Modulkürzel	inf800
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum - Pflichtbereich • Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Nieße, Astrid (module responsibility) • Sauer, Jürgen (module responsibility) • Diethelm, Ira (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	The specific participation requirements are described in the individual assigned courses.
Skills to be acquired in this module	Supported by a lecturer the students familiarise with a given topic by literature research. They understand and evaluate the relevance of the literature. After this evaluation the students present and discuss their solutions academically. Professional competence The students: • characterise and apply computer science basics (algorithms, data structures, programming, basics of practical, technical and theoretical computer science) • define und describe essential mathematical, logical and physical basics of computer science • define and illustrate the core disciplines of computer science (theoretical, practical and technical computer science) Methodological competence The students: • examine problems, use formal methods to phrase them and analyze them appropriately • evaluate problems by the use of technical and scientific literature • reflect on a scientific topic and write a scientific seminar paper under guidance and present their findings Social competence The students: • communicate considerably and appropriately with users and experts • use presentation methods Self-competence The students: • plan their informatical actions independently • reflect their contributions critically and discuss them with users and experts • collect and update their knowledge independently
Module contents	according to the assigned task
Literatureempfehlungen	
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	each semester
Module capacity	unlimited
Reference text	Students must attend one of the seminars offered.

Passing the proseminar is a prerequisite for registering for the Bachelor's thesis.

Teaching/Learning method		S
Previous knowledge		none
Examination	Prüfungszeiten	Type of examination
Final exam of module	Am Ende des Semesters und nach Absprache	
		• Active participation in the seminar is expected • Paper and presentation
Lehrveranstaltungsform	Seminar	
SWS	2	
Frequency	SoSe oder WiSe	
Workload Präsenzzeit	28 h	

inf803 - Special Topics in Computer Science I

Module label	Special Topics in Computer Science I
Modulkürzel	inf803
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Diethelm, Ira (module responsibility) • Nieße, Astrid (module responsibility) • Sauer, Jürgen (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	The expected previous knowledge is specified in the details of the assigned course.
Skills to be acquired in this module	This module integrates current computer science developments within appropriate study courses. Professional competence The students: • know recent technological or scientific computer science developments • transfer computer science methods and development models to IT application area requirements • evaluate the possibilities and limitations of computer science methods and tools and apply them appropriately Methodological competence The students: • review problems, formulate them with formal models and explore them appropriately • identify and present (one or more) computer science problem solutions • select and evaluate appropriate tools and methods • examine problems with technical and scientific literature Social competence The students: • work in a team Self-competence The students: • plan their informatical actions independently
Module contents	According to the assigned course
Literatureempfehlungen	According to the assigned course
Links	
Languages of instruction	German, English

Duration (semesters)		1 Semester
Module frequency		semi-annual
Module capacity		unlimited
Reference text		Falls mehr dem Modul mehr als eine Veranstaltung zugeordnet ist, wählen Sie in der Regel Veranstaltungen im Gesamtumfang von 4 SWS aus, bspw. eine Vorlesung mit zugehöriger Übung. Weitere Informationen finden Sie in der Beschreibung (Details) der zugeordneten Veranstaltungen.
Teaching/Learning method		2 VA aus V, Ü, S, P, PR
Examination	Prüfungszeiten	Type of examination
Final exam of module		Exercises or presentation or oral exam or written exam
Lehrveranstaltungsform	VA-Auswahl	
SWS	4	
Frequency	siehe Angebotsrhythmus Modul	
Workload Präsenzzeit	56 h	

inf804 - Special Topics in Computer Science II

Module label	Special Topics in Computer Science II
Modulkürzel	inf804
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Diethelm, Ira (module responsibility) • Nieße, Astrid (module responsibility) • Sauer, Jürgen (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	The expected previous knowledge is specified in the details of the assigned course.
Skills to be acquired in this module	This module integrates current computer science developments within appropriate study courses. Professional competence The students: • know recent technological or scientific computer science developments • transfer computer science methods and development models to IT application area requirements • evaluate the possibilities and limitations of computer science methods and tools and apply them appropriately Methodological competence The students: • review problems, formulate them with formal models and explore them appropriately • identify and present (one or more) computer science problem solutions • select and evaluate appropriate tools and methods • examine problems with technical and scientific literature Social competence The students: • work in a team Self-competence The students: • plan their informatical actions independently
Module contents	According to the assigned course
Literatureempfehlungen	According to the assigned course
Links	
Languages of instruction	German, English

Duration (semesters)		1 Semester
Module frequency		irregularly
Module capacity		unlimited
Reference text		Falls mehr dem Modul mehr als eine Veranstaltung zugeordnet ist, wählen Sie in der Regel Veranstaltungen im Gesamtumfang von 4 SWS aus, bspw. eine Vorlesung mit zugehöriger Übung. Weitere Informationen finden Sie in der Beschreibung (Details) der zugeordneten Veranstaltungen.
Teaching/Learning method		2VA aus V, Ü, S, P, PR
Examination	Prüfungszeiten	Type of examination
Final exam of module		Exercises or presentation or oral exam or written exam
Lehrveranstaltungsform	VA-Auswahl	
SWS	4	
Frequency	siehe Angebotsrhythmus Modul	
Workload Präsenzzeit	56 h	

inf808 - Current Topics in Computer Science

Module label	Current Topics in Computer Science
Modulkürzel	inf808
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Praktische Vertiefung (60 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Praktische Vertiefung der Informatik
Zuständige Personen	• Diethelm, Ira (module responsibility) • Nieße, Astrid (module responsibility) • Sauer, Jürgen (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	Keine
Skills to be acquired in this module	This module integrates current computer science developments within appropriate study courses. Professional competence The students: • Know recent technological or scientific computer science developments • Transfer computer science methods and development models to IT application area requirements • Evaluate the possibilities and limits of computer science methods and tools and apply them appropriately Methodological competence The students: • Review problems, formulate them with formal models and explore them appropriately • Identify and present (one or more) computer science problem solutions • Select and evaluate appropriate tools and methods • Reflect on a scientific topic and write a scientific seminar paper under guidance and present their findings Social competence The students: • Use presentation methods purposefully Self-competence The students: • Plan their informatical actions independently • Reflect their contributions critically and discuss them with users and experts • Collect and update their knowledge independently
Module contents	According to the assigned task
Literatureempfehlungen	According to the assigned task

Links

Language of instruction		German
Duration (semesters)		1 Semester
Module frequency		unregelmäßig
Module capacity		unlimited
Teaching/Learning method		1 VA aus V, Ü, S, P, PR
Examination	Prüfungszeiten	Type of examination
Final exam of module		Exercises or presentation or oral exam or written exam

Lehrveranstaltungsform	VA-Auswahl
SWS	2
Frequency	siehe Angebotsrhythmus Modul
Workload Präsenzzeit	28 h

Abschlussmodul

mam - Master Thesis and Colloquium

Module label	Master Thesis and Colloquium	
Modulkürzel	mam	
Credit points	24.0 KP	
Workload	720 h	
Verwendbarkeit des Moduls	Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Abschlussmodul	
Zuständige Personen	- Lehrenden, Die im Modul (Prüfungsberechtigt) - Diethelm, Ira (Prüfungsberechtigt)	
Prerequisites	no participant requirements	
Skills to be acquired in this module	By completing the master's thesis, the student provides evidence that he/she is able to process and solve complex and holistic tasks in computer science on the basis of comprehensive scientific knowledge and by applying the scientific method apparatus. In particular, the student has brought the technical and methodological knowledge acquired during the master's program as well as his/her technical and social competence into the processing of the master's thesis and applied them successfully. The master's seminar serves to discuss the content and methodology of the master's thesis. At the same time, it serves as an exchange of scientific and practical experience and enables the students to reflect on different approaches to solutions on the basis of theoretical knowledge and experience. The master seminar ends with a colloquium on the master thesis.	
Module contents	Corresponding topic from computer science	
Literatureempfehlungen	Will be specified according to the concrete topic	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	every semester	
Module capacity	unlimited	
Teaching/Learning method	1S	
Previous knowledge	none	
Examination	Prüfungszeiten	Type of examination
Final exam of module		G
Lehrveranstaltungsform	Seminar	
SWS	2	
Frequency	SoSe und WiSe	
Workload Präsenzzeit	28 h	

Akzentsetzungsbereich

inf010 - Computer Networks

Module label	Computer Networks
Modulkürzel	inf010
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum-Wahlbereich Praktische Informatik • Bachelor's Programme Computing Science (Bachelor) > Wahlpflichtbereich Praktische Informatik • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Kramer, Oliver (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	Professional competence The students: • identify the layers of the ISO/OSI model • recognise the main concepts and algorithms of each IOS/OSI layer • assign technical processes to the layers • classify new technologies to the main concepts of the ISO/OSI model - Compare different methods and approaches of a layer (i.e. TCP and UDP) • characterise safety-critical aspects of each layer Methodological competence The students: • administer small networks • characterise safety-critical aspects of networks Social competence The students: • work on exercises in small teams Self-competence The students: • accept criticism • reflect on their proposed solutions, taking into account the methods taught
Module contents	Contents of this lecture (cf. suggested reading Tanenbaum and Wetherall): • Introduction to networks and the internet • Physical Layer • Data Link Layer • MAC Sub-Layer • Network Layer • Transport Layer • Session Layer • Presentation Layer • Application Layer • Technologies (Cable and Co) • Nyquist Shannon and Transmissions - CDMA • Hamming & CRC • Stop & wait, go back n, selective repeat • Aloha & CSMA • Ethernet technologies • Wifi • Paket switchen & Dijkstra • IP Adressing & Header

- TCP
- UDP
- Buckets & TCP-Reno
- DNS
- Flask
- RSA & PGP
- Firewalls

Literaturempfehlungen

- lecture notes
- A. Tanenbaum & D. Wetherall: Computernetzwerke, Pearson Studium, 5. Aufl. 2012

Links

Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		none		
Examination		Prüfungszeiten		Type of examination
Final exam of module		At the end of the lecture period		Written or oral exam
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SoSe	42
Exercises		1	SoSe	14
Präsenzzeit Modul insgesamt				56 h

inf016 - Internet Technologies

Module label	Internet Technologies	
Modulkürzel	inf016	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum-Wahlbereich Praktische Informatik • Bachelor's Programme Computing Science (Bachelor) > Wahlpflichtbereich Praktische Informatik • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich	
Zuständige Personen	• Boles, Dietrich (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)	
Prerequisites	Useful previous knowloedge: object-oriented programming	
Skills to be acquired in this module	The graduates of the module know the basic concepts and technologies of Internet and web applications. They can evaluate the capability of the concepts and technologies to design Internet-based applications. The students will apply these concepts and techniques in a project. Professional competence The students: • Know basic concepts and technologies of the Internet and the web Methodological competence The students: • Are able to use the techniques in projects Social competence The students: • Implement web-based projects in a team Self-competence The students: • Reflect their own capabilities to develop Internet-based applications	
Module contents	The module deals with the basic development concepts of Internet-based applications. It covers relevant client technologies of web applications (HTML, CSS, JavaScript), server technologies (forms, servlets, PHP, databases) and technologies for client server communication (AJAX, WebSockets, Web services, Social-Media-APIs). Additional topics are web design, Internet law, security and web search. The practical exercises of this module consist of the design, implementation and presentation of a comprehensive web application. The topics of the lecture will be applied and deepened in practice.	
Literatureempfehlungen	list of links in the learning management system	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	every summer term	
Module capacity	unlimited	
Reference text		
Teaching/Learning method	V+Ü	
Previous knowledge	Useful previous knowloedge: object-oriented programming	
Examination	Prüfungszeiten	Type of examination
Final exam of module	The presentation of partial results of the practical project takes place weekly during the exercises.	project and written exam or project and oral exam

Examination		Prüfungszeiten	Type of examination	
		Final delivery of the final project is one week after the end of the lecture period. The written exam or oral exam take place in the last week of the lecture period or the first week after the end of the lecture period. Any re-examinations take place at the end of the semester break. The exact timetable can be found in the learning management system.		
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

inf200 - Computer Engineering I

Module label	Computer Engineering I
Modulkürzel	inf200
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Computing Science (Bachelor) > Basismodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Wahlpflicht Technische Informatik (30 KP) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Rauh, Andreas (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements
Skills to be acquired in this module	

he students learn to understand the construction of digital circuits and digital computers. They know the technological parameters, the state of the art technologies, and the developments characterizing current and future design paradigms for digital hardware. They learn to understand the concepts underlying current computer architectures and are able to explain how such architectures execute programs. Successful participants will be able to analyze computer architectures as a whole, to understand in depth, to analyze, and to optimize their hardware components, and to discuss the properties induced by selecting design alternatives.

Professional competences

The Students:

- identify fundamental concepts of the construction of digital computer systems, the internal number representation, and analysis of combinational logic as well as their optimization.

Methodological competences

The Students:

- analyze computer architectures on the basis of their individual components
- design and optimize digital hardware components
- transfer systematic approaches of hardware design to unknown design problems

Social competences

The Students:

- present their understanding of the functional principles of digital computer systems

Self-competences

The Students:

- critically reflect on the results of exercises and recognize limitations of different approaches to the design of digital computer systems

Module contents	This module is the first part of the introduction to computer engineering. It explains the construction principles of computers, from the implementation of an easy Instruction Set Architecture, over fundamental techniques for coding and representation of numbers, program execution on machine level, basics of logics and analysis of functions of combinational logic as well as their optimization.
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Literatureempfehlungen

- Lecture Notes
- Schiffmann, W.; Schmitz, R. (2001): Technische Informatik I, II, Übungsbuch; Springer Verlag, Berlin.
- Dal Cin, M. (1996): Rechnerarchitektur; B.G. Teubner.
- Lagemann, K. (1987): Rechnerstrukturen; Springer-Verlag, Berlin.
- Oberschelp, W.; Vossen, G. (1989): Rechneraufbau und Rechnerstrukturen; Oldenbourg-Verlag.

- Mano, Morris M.(1993): Computer System Architecture 3; Prentice Hall.
- Gajski, D.(1997): Principles of Digital Design; Prentice Hall.
- Patterson, D.A.; Hennessy, J.L. (1997): Computer Organization and Design:
- The Hardware/Software Interface; 2. Edition; Morgan Kaufmann Publishers.
- Wilkinson, B. (1996): Computer Architecture Design and Performance; 2. Edition; Prentice Hall.
- Tanenbaum, A.S.(1999): Structured Computer Organization; 4. Edition; Prentice Hall.

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		1VL + 1Ü		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture term	Written or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

inf201 - Computer Engineering II

Module label	Computer Engineering II
Modulkürzel	inf201
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Wahlpflicht Technische Informatik (30 KP) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Technische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Rauh, Andreas (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	Knowledge of the module "Computer Engineering I"
Skills to be acquired in this module	The module qualifies students to analyze computer architectures, understand computer components, design and optimize computers and components, and to discuss domain-specific hardware design. Professional Competences The students: • describe computer components • design and optimise computer components • describe and analyse electric circuits Methodological Competences The students: • analyse computer architectures • get familiar with fundamentals of the analysis and synthesis of flipflops and automata • get familiar with foundations of the analysis of electrical circuits Social Competences The students: • discuss computer hardware and manufacturing processes competently • are able to transfer their knowledge of hardware design to other domains different from computer science Self Competences The students: • critically reflect the results of exercises and acknowledge limitations of various approaches for the design of computer systems
Module contents	This module is the second part of the introduction to computer engineering. It explains sequential circuits (e.g. flipflops and automata), arithmetic and logical computer components, registers and memory, basics of computer communication as well as electrotechnical foundations.
Literatureempfehlungen	• Lecture Notes • Oberschelp, W., Vossen, G.: Rechneraufbau und Rechnerstrukturen; Oldenbourg Verlag • Gajski, D.: Principles of Digital Design; Prentice Hall 1997 • Patterson, D.A., Hennesy, J.L.: Computer Organisation and Design: The Hardware/Software Interface; 2. Edition; Morgan Kaufman Publishers, 1997 • Tannenbaum, A.S.: Structured Computer Organization ; 4. Edition; Prentice Hall, 1999
Links	

Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		Knowledge of the module "Computer Engineering I"		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture period	Written or oral Exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SoSe	42
Exercises		1	SoSe	14
Präsenzzeit Modul insgesamt				56 h

inf400 - Theoretical Computer Science: Logic

Module label	Theoretical Computer Science: Logic
Modulkürzel	inf400
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Computing Science (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Wahlpflicht Theoretische Informatik (30 KP) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Theoretische Informatik) • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Wehrheim, Heike (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements
Skills to be acquired in this module	Introduction to propositional logic, predicate logic, logic programming, and temporal logic Professional competence The students: • know syntax, semantics and applications of propositional logic, predicate logic, logic programming, and temporal logic • specify problems by using logical formulas • solve questions concerning propositional formulas with truth tables • draw conclusions in the field of propositional logic and predicate logic by means of natural deduction • answer queries to logic programs by using SLD resolution • perform model checking of Kripke structures with regard to CTL formulas algorithmically Methodological competence The students: • recognize logic as a versatile tool in computer science Social competence The students: • work together in small groups to solve problems • present solutions to problems to groups of other students Self-competence The students: • learn persistence in pursuing difficult tasks • learn precision in writing down solutions
Module contents	The course introduces propositional, predicate and temporal logic. In computer science it is essential to have a good understanding of logic because the language of logical formulas is widely used in the field of computer science. For example, Boolean expressions appear in every programming language and in circuit design; Horn clauses are used in knowledge representation; predicate logic and temporal logic are used for specifying software and hardware. More recent applications such as interactive and automatic proving as well as the logic programming language PROLOG emphasize the tool character of logic in computer science. The course introduces syntax, semantics, procedures, and calculi to prove the validity of formulas of propositional, predicate, and temporal logic. This is illustrated by many examples. Central is the concept of logical consequence. Topics: • propositional logic: syntax and semantics, truth tables, natural deduction • predicate logic: syntax and semantics, natural deduction • logic programming: declarative and procedural semantics, unification algorithm (Robinson), SLD resolution, PROLOG • temporal logic CTL: syntax and semantics of Kripke structures, CTL model checking algorithm

Literaturempfehlungen

Essential: Script "Logik" (in German), in its current edition
Recommended: D. van Dalen: "Logic and Structure", Fourth Edition. Springer-Verlag, 2004.
Good secondary reading: U. Schöning: "Logic for Computer Scientists", Birkhäuser, 1994.

Links

Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture period	written exam or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SoSe	42
Exercises		1	SoSe	14
Präsenzzeit Modul insgesamt				56 h

inf401 - Foundations of Theoretical Computer Science

Module label	Foundations of Theoretical Computer Science
Modulkürzel	inf401
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Wahlpflicht Theoretische Informatik (30 KP) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Wehrheim, Heike (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	Introduction to the theory of automata, formal languages, computability, and complexity Professional competence The students: • know different classes of languages (e.g. regular and context-free languages) • know automata models corresponding to the respective language classes (e.g. finite automata, pushdown automata, Turing machines) • construct automata, Turing machines, and grammars for given tasks • know equivalent formalisations of the concept of algorithm • classify functions as algorithmically computable and problems as algorithmically decidable • know and recognize undecidable problems • evaluate the complexity of algorithms • know problems that are solvable deterministically or nondeterministically in polynomial time Methodological competence The students: • learn about the power of abstract models of computation Social competence The students: • work together in small groups to solve problems • present solutions to problems to groups of other students Self-competence The students: • learn persistence in pursuing difficult tasks • learn precision in writing down solutions
Module contents	In the first part of the course, different classes of languages are introduced (regular and context-free languages). For each class a matching automata model is presented (finite automata, pushdown automata). Various properties are proven for the introduced classes of languages and models of automata. In the second part of the course, we examine which functions are computable and which problems are decidable. To this end, the concept of algorithm is formalised. Turing machines and grammars turn out as equivalent approaches. We show that there are problems that are undecidable. Many of these problems are of practical interest. The third part of the course deals with the complexity of algorithms, i.e. how much time and space is required to solve a problem. In particular, we consider problems that are solvable in polynomial time, either deterministically or non-deterministically. These problems are classified as P and NP.
Literatureempfehlungen	Essential: • Skript "Grundbegriffe der Theoretischen Informatik", jeweils in aktueller

Ausgabe

Recommended:

- Schöning: "Theoretische Informatik kurzgefasst", 5. Auflage, Spektrum, 2008

Good secondary literature:

- Hopcroft, Motwani, Ullman: "Einführung in die Automatentheorie, Formale Sprachen und Komplexitätstheorie", Pearson, 2002 (ein Klassiker...)

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the end of the lecture period	Written or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

inf530 - Artificial Intelligence

Module label	Artificial Intelligence
Modulkürzel	inf530
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Angewandte Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Sauer, Jürgen (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	• Basic knowledge of computer science/business informatics
Skills to be acquired in this module	The students are familiar with the basic concepts of artificial intelligence (AI). They know the concept of rational agents and their behavior. They know how to implement expert systems. They also know basic search and problem solving techniques as well as techniques of knowledge representation. The students can compare different problem solving techniques and use them within other problem contexts. Professional competence The students: • describe the concept of rational agents and their behavior in an agent environment • name and describe the basic search and problem solving techniques of Artificial Intelligence • describe and implement expert systems • describe basic techniques of knowledge representation Methodological competence The students: • acknowledge the basic methods of AI • transfer AI methods to other application areas • evaluate AI methods regarding their appropriateness for distinct problem areas • modify and adapt AI methods for specific application areas Social competence The students: • work in teams • present results to groups Self-competence The students: • reflect their results with regard to the methods of AI
Module contents	• Overview of AI • Rational agents and agent based systems • Search and other problem solving techniques • Knowledge representation • Planning
Literatureempfehlungen	

- Russel, S. J.: Norvig, Peter (2012): Artificial Intelligence: A modern Approach, 3rd Ed.
- Winston, P.H. (1994): Artificial Intelligence, 3rd Edition

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		Basic knowledge of computer science/business informatics		
Examination	Prüfungszeiten		Type of examination	
Final exam of module				
	At the end of the lecture period		Written or oral exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

inf604 - Business Intelligence I

Module label	Business Intelligence I
Modulkürzel	inf604
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master Applied Economics and Data Science (Master) > Data Science • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule Bereich Wirtschaftsinformatik • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik • Master's Programme Computing Science (Master) > Angewandte Informatik • Master's Programme Engineering of Socio-Technical Systems (Master) > Embedded Brain Computer Interaction • Master's Programme Engineering of Socio-Technical Systems (Master) > Human-Computer Interaction • Master's Programme Engineering of Socio-Technical Systems (Master) > Systems Engineering
Zuständige Personen	• Marx Gómez, Jorge (Prüfungsberechtigt) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	Objective of the module/skills: Current module provides basics of business intelligence with focus on enterprises and strong emphasis on data warehousing technologies. Students of the course are provided with knowledge, which reflects current research and development in a data analytic domain. Professional competence The students: • name and recognize the role of business intelligence as part of daily business process • being able to analyse advantages and disadvantages of different approaches and methods of the data analytics and being able to apply them in simple case studies • obtain theoretical knowledge about data collection and modelling processes, including most applicable approaches and best practices Methodological competence The students: • being able to execute typical tasks of business intelligence, and also being able to deepen knowledge on different approaches and methods • gain a hands on experience and being able to understand advantages and disadvantages of different methods and being able to use obtained knowledge in most efficient ways Social competence The students: • build solutions based on case studies given to the group, for example solving the issue of a factless fact table • discuss solutions on a technical level • present obtained case studies solutions as part of the exercises Self-competence The students: • critically review provided data and information

Module contents

Data warehouse technology together with business intelligence are

increasingly being used by business in order to get better decision support and enrich ongoing processes with data-rich decisions. Data warehouse technology enables an integration of data from heterogeneous sources, whether business intelligence builds data processing on top of it. For instance, business intelligence allows to build reporting on very large volumes of data (including historical) coming primarily from data warehouse.

As part of the current module following contents are taught:

- Definition and scope of business intelligence.
- Procedures and objectives of data warehousing.
- Process of extracting, transforming and loading (ETL) of data.
- Phases of data modelling, data capturing and reporting in conjunction with a plausible case studies/scenarios.
- Prospects for further and evolving topics for business intelligence (e.g. Adaptive Business Intelligence, In-Memory Computing. etc.)
- Introduction to Data Mining.
- Case studies based practical exercises and assessments in order to impart practical knowledge.

Literatureempfehlungen

- Marx Gómez, Rautenstrauch, Cissek (2008): Einführung in die Business Intelligence mit SAP NetWeaver 7.0.
- Marx Gómez, Rautenstrauch, Cissek, Grahlher (2006): Einführung in SAP Business Information Warehouse, Springer, Heidelberg.
- Moss, Atré (2006): Business Intelligence Roadmap, Addison-Wesley, Boston.
- Loshin (2003): Business Intelligence, Kaufmann, Amsterdam.
- Müller, Lenz (2013): Business Intelligence.
- Sabherwal, Becerra-Fernandez (2010): Business Intelligence: Practices, Technologies, and Management

Links

<http://www.wi-ol.de>

Languages of instruction	German, English
Duration (semesters)	1 Semester
Module frequency	annual
Module capacity	unlimited
Teaching/Learning method	V + Ü
Previous knowledge	none

Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture period	Written exam max. 120 minutes

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

inf608 - eBusiness

Module label	eBusiness
Modulkürzel	inf608
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum - Pflichtbereich • Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlbereich Informatik • Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Angewandte Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
Zuständige Personen	• Marx Gómez, Jorge (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)

Prerequisites

No participant requirement

Skills to be acquired in this module

The module provides an introduction to the "Electronic Business" (e-business). The graduates know the fundamental and current technologies, advanced concepts, applications and competitive strategies of the "Electronic-Commerce" (e-commerce). The knowledge and abilities acquired in this module are directly applicable in study and business. They are deepening the basics from the module „Wirtschaftsinformatik II“. They provide a professional e-business consulting background and the skills to design software products for this area of business in practice.

Professional competence

The students:

- name and discuss the eBusiness key challenges
- discuss the chances of the added value and the changes of commercial models by the internet
- define the concepts of e-business and e-commerce.
- discuss the change of retail trade and the transactions between companies in e-business
- name current payment systems and communication technologies
- discuss the possibilities of the internet in order to simplify the administration and the coordination of internal and external business processes
- characterise the challenges for the management caused by e-business and e-commerce
- differentiate the concepts and conceptualities of e-business
- assess applications with regard to economic points of view
- practically learn how to handle core technologies of e-business

Methodological competence

The students:

- assess the core technologies of e-business and e-commerce
- apply methods in case studies

Social competence

The students:

- develop case studies on basis of given problems in groups
- present their solutions

Self-competence

The students:

- learn about their own limitations while planning and developing e-commerce applications

Module contents

The module provides the following contents:

- the definition of the core e-business concepts and the technical conditions for the implementation
- introduction of the variations of e-commerce, especially the Business-to-Consumer (B2C) and Business-2-Business (B2B) concepts and the current research in this field
- discussion on the economic aspects of e-business based on the theory of informational added value
- technological basics of the web and current development technologies for e-commerce web applications and security mechanisms with focus on online-shops and applications (hands-on exercise topics: HTTP, JSP and SQLInjection, PHP, XML, XML-Security, data modelling, Online-Shop development and Online-Shop administration)

Literatureempfehlungen

- Meier, Andreas; Management der digitalen Wertschöpfungskette. Springer, 2. Auflage, 2008.
- Wirtz, Bernd W.: Electronic Business. Springer Gabler, 4. Auflage, 2013.
- Kollmann, Tobias: E-Business: Grundlagen Elektronischer Geschäftsprozesse in der Net Economy. Gabler, 4. Auflage, 2010.

Links

<http://www.wi-ol.de/>

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	annual
Module capacity	unlimited
Teaching/Learning method	V+Ü
Previous knowledge	none

Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture period	Written or oral exam

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

inf653 - ERP Technologies

Module label	ERP Technologies
Modulkürzel	inf653
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule Bereich Wirtschaftsinformatik • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik • Master's Programme Computing Science (Master) > Angewandte Informatik
Zuständige Personen	• Marx Gómez, Jorge (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	Learning objectives Generation of understandings into the working approaches and tasks of ERP systems Examining components of ERP systems Generating knowledge about important aspects of the operation processes of ERP systems, such as data storage and processing, user management, and system maintenance. Professional competence • The students: • describe ERP systems in compliance with functions and technologies • identify state-of-the-art and future architectures of ERP systems • discuss the usage of core technologies (also in practical case studies, for example with SAP NetWeaver) Methodological competence • The students: • categorize fundamental technologies in combination with other enterprise-wide information systems • apply the presented methods in practical contexts Social Competence The students: • construct solutions to given problems in groups • present solutions to computing science problems before groups Self-competence The students: • recognize the limit of their capacity in implementing and customizing of business application systems
Module contents	The module provides the following content: • Overview of the components of ERP systems and their functionality and administration • In-depth analysis of ERP system architecture under consideration of surface structures and user • management in ERP systems, with focus on of data storage, particularly the used data models and database structures, backup and recovery strategies • Deployment of ERP applications in form of application service providing, including the technical characteristics of this business model, especially Special Administration, delimitation and monitoring tasks for systems, which at the same time be provided several customers • Lecture will be accompanied by SAP case studies.
Literatureempfehlungen	• Gronau (2004): Enterprise Resource Planning und Supply Chain Management, Oldenbourg, München

- Rautenstrauch, Schulze (2003): Informatik für Wirtschaftswissenschaftler und Wirtschaftsinformatiker, Springer, Heidelberg
- Sumner (2005): Enterprise Resource Planning, Prentice Hall

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		1VL + 1Ü		
Previous knowledge		none		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		End of lecture period	Portfolio or practical exercises and written exam	
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

inf654 - Mobile Commerce

Module label	Mobile Commerce
Modulkürzel	inf654
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule Bereich Wirtschaftsinformatik • Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik • Master's Programme Computing Science (Master) > Angewandte Informatik
Zuständige Personen	• Marx Gómez, Jorge (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	Professional competence The students: • define and encompass MC • explain the development stages of MC • are aware of the current developments within MC and are able to classify them • get to know technical essentials, functionalities and standards of wireless ICT • assess the fields of application and limitations of wireless ICT • examine the relevant mobile devices and their respective operating systems, know their characteristics and evaluate their fields of application • examine market participants, assess business models, optimize business processes • gain insight into specifics via examples and exercises Methodological competence The students: • get to know security aspects and specifics of mobile application design • prototypically develop an Android application • prepare and give presentations • develop a concept of a business model for an Android application Social competence The students: • work on their project in groups of three Self-competence The students: • reflect their own group-dynamic activities in respect of a mutual goal (successfully finish their project)
Module contents	See above
Literatureempfehlungen	• Turowski, K.; Pousttchi, K.: Mobile Commerce – Grundlagen und Techniken. 1. Aufl., Springer, Heidelberg 2004 • Also all materials provided within the lecture

Links

Language of instruction		German
Duration (semesters)		1 Semester
Module frequency		annual
Module capacity		unlimited
Teaching/Learning method		V+Ü
Previous knowledge		none
Examination	Prüfungszeiten	Type of examination
Final exam of module		
	After the lecture	Portfolio

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

