
Modulhandbuch

**Computing Science - Master of Education Programme (Hauptschule and
Realschule)**

im Summer semester 2024

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Mastermodule

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

Literatureempfehlungen

- 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	

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

inf040 - Introduction to Data Science

Module label	Introduction to Data Science
Modulkürzel	inf040
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 • Bachelor's Programme Sustainability Economics (Bachelor) > Wahlpflichtbereich • Master Applied Economics and Data Science (Master) > Data Science • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Theoretische 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 • Master's Programme Computing Science (Master) > Praktische Informatik
Zuständige Personen	• Wingerath, Wolfram (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	Basics of databases, Python programming and statistics
Skills to be acquired in this module	The module teaches fundamentals from the field of Data Science, covering purposes, challenges, and common best practices. Professional competences The students • have knowledge of basic concepts, problems and solution approaches from the field of Data Science. • are able to justify the choice of specific data analysis methods for a given problem • include possible imponderables in the analysis when evaluating analysis results Methodological competences The students • are able to translate questions from a specific domain into a feasible analysis • work on Data Science tasks to expand their understanding of the different approaches and methods. Social competences The students • discuss approaches and problems encountered in smaller and larger groups Self competences The students • reflect on their actions when identifying possible solutions and critically question their own results
Module contents	

Data Science is an interdisciplinary science at the intersection of statistics, machine learning, data visualization, and mathematical modeling. This course is designed to provide a practical introduction to the field of Data Science by teaching theoretical principles while also applying them practically. Topics covered range from data collection and preparation (data sources & formats, data cleaning, data bias), mathematical foundations (statistical distributions, correlation analysis, significance) and methods for visualization (tables & plots, histograms, best practices) to the development of models for classifying or predicting values (linear regression, classification, clustering).

Literaturempfehlungen

See description of the assigned course

Links

Language of instruction		English
Duration (semesters)		1 Semester
Module frequency		regular in summer term
Module capacity		unlimited
Teaching/Learning method		V + Ü
Previous knowledge		Basics of databases, Python programming and statistics
Examination	Prüfungszeiten	Type of examination
Final exam of module		
	At the end of the lecture period or by arrangement with the instructor.	Written or oral exam or portfolio or project or practical exercise

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe oder WiSe	28
Exercises		2	SoSe oder WiSe	28
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

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	

inf207 - Electrical Engineering

Module label	Electrical Engineering
Modulkürzel	inf207
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) > 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's Programme Computing Science (Master) > Interdisziplinäre Module
Zuständige Personen	• Hein, Andreas (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	Module Analysis II or Numerics
Skills to be acquired in this module	Professional competence: The students: • analyse linear electrical networks (direct current and alternating current) • name basic concepts to calculate and to use electrical and magnetic fields • list the characteristics of simple electrical elements (two terminal networks) • calculate the parameters of simple electrical networks/wirings • apply computer based analysing tools • design and implement simple networks/wirings Methodological competence: The students: • transfer calculation methods onto complex dynamic systems • implement electrical system models Social competence: The students: • present solutions for specific questions Self-competence: The students: • reflect their solutions by using methods learned in this course
Module contents	• Basic concepts (electric dimensions and units) • Network elements • Calculation of linear direct current networks (Ohms law, Kirchhoff's circuit law, superposition principle) • Characteristics, calculations and representations of electric and magnetic fields • Construction elements (capacitor and coil) • Extensions of periodical dimensions dependent on time, pointer representation, calculations with complex root-mean-square value pointers
Literatureempfehlungen	essential: • slides • Albach: Grundlagen der Elektrotechnik 1 und 2. Pearson Studium, 2004. recommended: • Hagmann, G.: Grundlagen der Elektrotechnik. AULA-Verlag, 2002. • Hagmann, G.: Aufgabensammlung zu den Grundlagen der

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Previous knowledge		Module Analysis II or Numerics		
Examination		Prüfungszeiten	Type of examination	
Final exam of module		At the End of the Semester	Hands-on exercises / 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

inf420 - Introduction to IT-Security

Module label	Introduction to IT-Security
Modulkürzel	inf420
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) > Pflichtmodule • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Angewandte Informatik) • Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Theoretische 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 • Master's Programme Computing Science (Master) > Praktische Informatik
Zuständige Personen	• Peter, Andreas (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirements
Skills to be acquired in this module	

Students understand the basic concepts, methods and protocols for protecting data and systems from manipulation and misuse on a basic, practice-oriented, scientific level (see "contents of the module"). The students can explain the causes of security problems in today's systems, can reproduce the connections between protection mechanisms and the problems they address, and can apply them to case studies. They can identify vulnerabilities, analyze them and understand the attack mechanisms described. In addition, the students are able to discuss possible solutions and are able to protect systems accordingly.

Professional competence

The students

- understand the semantics of security and explain the properties of secure IT systems (see "contents of the module"),
- discuss the importance of IT security, and
- carry out simple security analyses of systems.

Methodological competence

The students

- use concepts and techniques to increase security, in particular regarding which protection goals can be achieved with which techniques (see "contents of the module"),
- apply mechanisms of IT security in simple scenarios, and
- question the properties and limits of security concepts and combine different concepts in a meaningful way.

Social competence

The students

- solve problems partially in small groups and thus improve their willingness to cooperate and their communication skills,
- present solutions to IT security problems in front of the exercise group,
- discuss their different solutions within the exercise group, and
- improve their English language skills.

Self-competence

The students

- motivate themselves to work on questions and problems in the domain of IT security,
- justify their own actions with theoretical and methodical knowledge, and
- critically reflect on proposed solutions in relation to social expectations

and consequences, taking into account the methods taught.

Module contents

The course provides a broad introduction to IT security, covering the following topics:

- basic terms, concepts, and principles in IT security,
- major cryptographic building blocks (encryption, signatures, ...),
- access control models and mechanisms,
- authentication and key exchange protocols,
- network security basics,
- anonymous communication (including TOR), and
- basics of privacy protection.

Literatureempfehlungen

- C. Eckert. IT-Sicherheit: Konzepte – Verfahren – Protokolle. 10th edition. De Gruyter Oldenbourg, ISBN 978-3-110-58468-4, 2018
- P. van Oorschot. Computer Security and the Internet. 2nd edition. Springer, ISBN 978-3-030-83410-4, 2021
- R. Anderson. Security Engineering: A Guide to Building Dependable Distributed Systems. 2nd edition. Wiley, ISBN 978-0470068526, 2008

Links

Language of instruction	English
Duration (semesters)	1 Semester
Module frequency	Every winter semester
Module capacity	unlimited
Teaching/Learning method	V+Ü
Previous knowledge	Hard requirement: Fundamental knowledge on algorithms, discrete structures, and linear algebra as for instance covered in the following courses at the UOL: • inf030 Programmierung, Datenstrukturen und Algorithmen • mat950 Diskrete Strukturen • mat955 Linear Algebra für Informatik Useful (but optional) additional knowledge: Basics of computer networks as for instance covered in the UOL course inf010 Rechnernetze

Examination	Prüfungszeiten	Type of examination
Final exam of module		Written or oral exam

Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	2
Exercises		2	WiSe	2
Präsenzzeit Modul insgesamt				4 h

inf518 - Foundations of Energy Informatics

Module label	Foundations of Energy Informatics
Modulkürzel	inf518
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 (Praktische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule
Zuständige Personen	• Lehrenden, Die im Modul (Prüfungsberechtigt) • Rauh, Andreas (module responsibility) • Vogel-Sonnenschein, Ute (module responsibility)
Prerequisites	Diesem Modul können Sie gut folgen, wenn Sie Vorkenntnisse mitbringen in • Grundkenntnisse in Lineare Algebra, • Analysis, • Grundlegende Programmierkenntnisse
Skills to be acquired in this module	The students learn to recognize the limits of their own specialist discipline in the application and to identify and classify research questions. They have a basic understanding of the structure of such systems and their physical/chemical properties. and can model simple system components. Professional competences The students • know the basics of modern energy systems and energy markets • can critically classify issues in the context of energy systems and energy research • are familiar with the structure of selected energy-related components in energy systems • know the regulatory challenges and components in energy systems and their electrotechnical properties • know approaches to the experimental identification of energy technology components. Methodological competences The students • can apply computer science methods for energy systems and energy research • can model and simulate simple dynamic systems in a control-oriented form in Matlab/Simulink • independently acquire knowledge on given questions Social competences The students • discuss appreciatively in an interdisciplinary context • work cooperatively in teams to solve given tasks Self competences The students • deepen their competence in presenting the results they have worked out themselves
Module contents	

The first part of the module gives an introduction to the different topics in energy informatics. The role of computer science in this area is explained on the basis of a subject area and the connection between energy technology and energy management issues and basic IT skills is shown.

Topics are

- Foundations of electrical engineering and power management
- Energy markets
- Network planning and management
- Demand Side Management
- Virtual Power Plants

The second part addresses the control-oriented modelling on the example of energy systems and components taking into account their physical and electro-technical features.

We will derive models of system components like battery storage, wind turbines, photovoltaics and fuel cells.

The participants will design first control-oriented Models with MatLab/Simulink and validate them e.g. by using measurements of open circuit voltages of batteries. (Basics of Matlab Simulink will be explained in the tutorials. The batteries' internal resistances and charge/discharge dynamics are identified by controllable electronic loads in conjunction with programmable rapid control prototyping hardware

Literaturempfehlungen				
Links				
Languages of instruction		German, English		
Duration (semesters)		1 Semester		
Module frequency		every summer term		
Module capacity		20		
Teaching/Learning method		V+Ü		
Previous knowledge		Linear algebra, calculus, basic programming skills		
Examination	Prüfungszeiten		Type of examination	
Final exam of module				
		During the semester		Portfolio
Lehrveranstaltungsform	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

inf521 - Medical Informatics

Module label	Medical Informatics
Modulkürzel	inf521
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte 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
Zuständige Personen	• Wulff, Antje (module responsibility) • Kaspar, Mathias (Module counselling) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	No participant requirement
Skills to be acquired in this module	This module provides an introduction to the medical informatics and medical technology. Professional competence The students: • know the medical and healthcare computer science applications • know typical IT solutions and infrastructures • know the legal framework to process care data • know medical classifications and nomenclatures and the DRG-System and are able to apply them Methodological competence The students: • know bio-medical research requirements and patient data privacy methods • know communication standards and apply them in small-scale scenarios • know and apply patient safety and risk management methods • know and apply biosignal and image processing methods Social competence The students: • realise the importance of communication during the software development process between developer, customer and user of a successful and secure system. Feedback, request, respectful cooperation and the empathy of other disciplines' working processes are of great importance. Self-competence The students: • realise their responsibility as a medical informatic and reflect their impact on patients, medical employers and hospitals (corporates)

Module contents

- Medical informatics introduction / medical documentation
 - Medical documentation / progression of disease
 - Healthcare information systems
 - Terminology and classification / Medical controlling
 - Image processing / interoperability and communication standards
 - Medical data privacy
 - Medical research
 - Analyses of information system data
 - Decision making support and process management
 - MI/MT patient safetiness (Regulatory Affairs)
 - Telemedicine / Customer Health informatics
 - Medical technology introduction, biomedical technology
 - Biosignal processing, sensor technology
 - Robotics, prosthetics
-

Literaturempfehlungen

- Jan van Bommel , M.A. Musen , Mark A. Musen (Hrsg.): Handbook of Medical Informatics. Springer, Heidelberg 1997
- Christian Johner und Peter Haas (Hrsg.): Praxishandbuch IT im Gesundheitswesen
- Carl Hanser Verlag München 2009
- Dugas, Schmidt: Medizinische Informatik und Bioinformatik. Springer Verlag, Berlin, 2003

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 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

inf528 - Introduction to Medical Informatics

Module label	Introduction to Medical Informatics
Modulkürzel	inf528
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 (Praktische Informatik) • Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule
Zuständige Personen	• Wulff, Antje (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	

Introduction to medical informatics

Professional competences

The students

- know the application areas of medical informatics
- know the challenges of informatics in the field of health care
- know IT solutions and infrastructures in the field of health care
- know standards for data exchange and data-driven communication in health care

Methodological competences

The students

- recognize and be able to apply the basic methods in the field of medical informatics, specifically:
- learn how to analyze and model health care processes, information systems, and data
- understand medical information models and communication standards

Social competences

The students

- recognize the importance of interdisciplinary communication and collaboration in digitalisation in medicine
- develop, present and discuss the solutions from the exercises with others

Self competences

The students

- are aware of their heterogeneous tasks, responsibility and influence as a computer scientist in the health care sector
- reflect on problems and solutions, incorporating the methods they have learned

Module contents

The assigned lectures will provide an overview of the fields of medical informatics and the unique challenges of applying informatics methods and technologies to medicine and health care.

Literatureempfehlungen

Will be announced in the course

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	Written or oral exam

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

inf529 - Big Data in Medicine

Module label	Big Data in Medicine
Modulkürzel	inf529
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 (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule
Zuständige Personen	• Wulff, Antje (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	Introduction to the subfield "Big Data in Medicine" from the field of medical informatics. Professional competences The students • know the definition and meaning of "Big Data" in the medical context • know the challenges of dealing with healthcare data sets • know the Big Data pipeline and examples from the different areas of the pipeline for the medical context Methodological competences The students • recognize potentials and challenges in data-driven use cases from the healthcare sector • can describe the characteristics of medical data sets using the methods learned • can design solutions for medical, data-driven issues using the methods learned Social competences The students • recognize the importance of interdisciplinary communication and collaboration in the analysis of medical data • develop, present and discuss the solutions from the exercises with others Self competences The students • know their responsibilities when dealing with medical records • reflect on problems and solutions, incorporating the methods they have learned
Module contents	The assigned lectures will provide an overview of the subject area "Big Data in Medicine" and the particular challenges and characteristics of medical data and its sources, (storage) infrastructures, and processing and presentation options.
Literatureempfehlungen	Will be announced in the course
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	every summer term
Module capacity	unlimited
Teaching/Learning method	1VL + 1Ü oder 1PR
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
Exercise or project		2	SoSe	28
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

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 acquired 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

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

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

Literatureempfehlungen

- 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
Lecture		2	WiSe	56
Exercises		2	WiSe	0
Präsenzzeit Modul insgesamt				56 h

inf714 - Special Topics in Computer Science for Education

Module label	Special Topics in Computer Science for Education	
Modulkürzel	inf714	
Credit points	3.0 KP	
Workload	90 h	
Verwendbarkeit des Moduls	• Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule	
Zuständige Personen	• Diethelm, Ira (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)	
Prerequisites		
Skills to be acquired in this module	In diesem Modul werden aktuelle Themen mit Schulbezug aus den verschiedenen Gebieten der Informatik vertieft. Diese Themen können z.B. aus den Gebieten Betriebssysteme, Rechnerarchitekturen und Rechnernetze, Prozessmanagement, Versorgungstechnik oder Computational Intelligence sein. Einzelheiten zu Zielen und Inhalten entnehmen Sie bitte der zugeordneten Veranstaltung oder wenden Sie sich direkt an den Lehrenden Ziele des Moduls/Kompetenzen: In diesem Modul werden aktuelle Themen mit Schulbezug aus den verschiedenen Gebieten der Informatik vertieft. Diese Themen können z.B. aus den Gebieten Betriebssysteme, Rechnerarchitekturen und Rechnernetze, Prozessmanagement, Versorgungstechnik oder Computational Intelligence sein. Einzelheiten zu Zielen und Inhalten entnehmen Sie bitte der zugeordneten Veranstaltung oder wenden Sie sich direkt an den Lehrenden Fachkompetenz Die Studierenden: - benennen und differenzieren exemplarisch fortgeschrittene Methoden und Technologien der Informatik, z.B. aus dem Bereich Betriebssysteme, Rechnerarchitekturen und Rechnernetze, Prozessmanagement, Versorgungstechnik oder Computational Intelligence - erkennen die Komplexität von Informatiksystemen und dekonstruieren deren Funktions- und Wirkungsweisen - bewerten die (zukünftige) Entwicklung von Technologien der Informatik und ihre Auswirkungen - identifizieren und formulieren Anforderungen von Informatiksystemen Methodenkompetenz Die Studierenden: - kennen wissenschaftliche Arbeitsmethoden und wenden diese an einem speziellen schulelevanten Thema der Informatik an, z.B. Kryptographie, Modellierung, Automatisierungstechnik oder Betriebssystemen - recherchieren Methoden und Ansätze zum Lösen informatischer Problemstellungen, wie z.B. Verlässlichkeit, Sicherheit oder Persistenz von Daten - evaluieren Informatiksysteme/Technologien, z.B. unter gesellschaftlichen, ökonomischen und ökologischen Gesichtspunkten Sozialkompetenz Die Studierenden: - präsentieren ihre (Teil-)Ergebnisse - diskutieren getroffene Entscheidung und Ergebnisse ihrer Arbeit - arbeiten in Teams an Problemstellungen Selbstkompetenz Die Studierenden: - reflektieren Kritik und ändern ihr Handeln entsprechend - identifizieren Teilaufgaben und übernehmen Verantwortung für diese	
Module contents		
Literaturempfehlungen		
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	unregelmäßig	
Module capacity	unlimited	
Examination	Prüfungszeiten	Type of examination
Final exam of module	Am Ende der Vorlesungszeit nach Absprache mit dem Lehrenden	PF
Lehrveranstaltungsform	Seminar	

SWS

Frequency

siehe Angebotsrhythmus Modul

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

Literaturempfehlungen

- 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

Abschlussmodul

mam - Master Thesis and Colloquium

Module label	Master Thesis and Colloquium
Modulkürzel	mam
Credit points	21.0 KP
Workload	630 h
Verwendbarkeit des Moduls	• Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Abschlussmodul
Zuständige Personen	• Diethelm, Ira (module responsibility) • Lehrenden, Die im Modul (Prüfungsberechtigt)
Prerequisites	no participant requirements
Skills to be acquired in this module	The students prove that they are able to process and solve complex computer science tasks based on gained scientific knowledge and applied research methods. The students successfully implement a task especially by using their acquired professional and methodological knowledge and their professional and social competences. The accompanying seminar is used to discuss the master's thesis methodically and contentrelated. During the seminar the exchange of research and practical experience fosters the students' ability to discuss and evaluate their thesis with other students and experts. The master's thesis is finished by a colloquium. Professional competence The students: • Recognise and evaluate applied techniques and methods of their subject and are aware of their limits • Design solutions for complex, possibly vaguely defined or unusual computer science tasks/problems and evaluate these with reference to state of the art computer science and technology • 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 • Relate knowledge from different disciplines and apply this new knowledge in complex situations • Develop complex computer systems, processes and datamodels • 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 competence The students: • Identify and develop one or more solutions • Evaluate and apply tools, technology and methods sophisticatedly • Examine tasks with technical and research literature, write an academic article and present their solutions academically • Schedule processes and resources • Apply project management techniques • Combine new and original approaches and methods creatively • Evaluate problems/tasks, including new or developing subject areas of their discipline and apply computer science methods for solutions and research Social competence The students: • Communicate with users and experts convincingly • Take reasonable decisions Self-competence The students: • Pursue the overall and special computer science development critically • Implement innovative professional activities effectively and independently • Recognise their abilities and extend them purposefully

- Reflect their self-perception and actions with regard to professional, methodological and
- social aspects
- Develop and reflect self-developed hypothesis to theories independently
- Work in their field independently

Module contents		The content of this module is an independent topic research. The research findings will be presented and discussed in a master's thesis colloquium.
Literaturempfehlungen		Will be specified according to the concrete topic
Links		
Languages of instruction		German, English
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		Masterthesis, presentation and discussion
Lehrveranstaltungsform	Seminar	
SWS		
Frequency	SoSe und WiSe	

