
Modulhandbuch

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

im Summer semester 2025

erstellt am 24/04/25

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Mastermodule

inf009 - Database Practical

Module label	Database Practical
Module code	inf009
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none"> • 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
Responsible persons	<ul style="list-style-type: none"> • Grawunder, Marco (module responsibility) • Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	<p>Useful prior knowlegde :</p> <ul style="list-style-type: none"> • Basics of data base systems
Skills to be acquired in this module	<p>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.</p> <p>Professional competence The students:</p> <ul style="list-style-type: none"> • 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 <p>Methodological competence The students:</p> <ul style="list-style-type: none"> • propose concrete processing principles for special application classes • reflect on specific technologies and procedures with regard to their consequences <p>Social competence The students:</p> <ul style="list-style-type: none"> • Solve database system problems in a team <p>Self-competence The students:</p> <ul style="list-style-type: none"> • 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

Recommended reading

- 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

Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	every winter term	
Module capacity	unlimited	
Teaching/Learning method	P	
Examination	Prüfungszeiten	Type of examination
Final exam of module	During the lecture time	Practical Exercises
Type of course	Exercises	
SWS	4	
Frequency	WiSe	
Workload attendance time	56 h	

inf010 - Computer Networks

Module label	Computer Networks
Module code	inf010
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Kramer, Oliver (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)

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

Recommended reading

- 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

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SuSe	42
Exercises		1	SuSe	14
Total module attendance time				56 h

inf040 - Introduction to Data Science

Module label	Introduction to Data Science
Module code	inf040
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Wingerath, Wolfram (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	Basics of databases, Python programming and statistics
Skills to be acquired in this module	<p>The module teaches fundamentals from the field of Data Science, covering purposes, challenges, and common best practices.</p> <p>Professional competences</p> <p>The students</p> <ul style="list-style-type: none">• 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 <p>Methodological competences</p> <p>The students</p> <ul style="list-style-type: none">• 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. <p>Social competences</p> <p>The students</p> <ul style="list-style-type: none">• discuss approaches and problems encountered in smaller and larger groups <p>Self competences</p> <p>The students</p> <ul style="list-style-type: none">• 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).

Recommended reading

- The Data Science Design Manual (Seven Kiena, 2017)
- Invisible Women: Data Bias in a World Designed for Men (Caroline Criado-Perez, 2019)

Links

Language of instruction	English
Duration (semesters)	1 Semester
Module frequency	in winter term
Module capacity	unlimited
Teaching/Learning method	V+Ü

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Total module attendance time				56 h

inf201 - Computer Engineering II

Module label	Computer Engineering II
Module code	inf201
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Rauh, Andreas (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	
Skills to be acquired in this module	

This module is the second part of the two-semester introduction to computer engineering and is therefore complementary to the module Fundamentals of Computer Engineering. The module explains sequential circuits (e.g. flip-flops and automata), arithmetic and logical computer components, registers and memory, the basics of computer communication and the basics of electrical engineering.

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.

Recommended reading

- 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		
Examination	Prüfungszeiten	Type of examination		
Final exam of module				
	At the end of the lecture period	Written or oral Exam		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SuSe	42
Exercises		1	SuSe	14
Total module attendance time				56 h

inf202 - Computer Engineering Practical

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

Applicability of the module

- 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

Responsible persons

- Fränze, Martin Georg (module responsibility)
- Janßen, Detlef (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

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.

Recommended reading

- 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	P	
Examination	Prüfungszeiten	Type of examination
Final exam of module	At the end of the lecture term	Portfolio
Type of course	Practical training	
SWS	4	
Frequency	SuSe	
Workload attendance time	56 h	

inf207 - Electrical Engineering

Module label	Electrical Engineering
Module code	inf207
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Hein, Andreas (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)

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

Recommended reading

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 Elektrotechnik. AULA-Verlag, 2002.

Links				
Language of instruction		German		
Duration (semesters)		1 Semester		
Module frequency		annual		
Module capacity		unlimited		
Teaching/Learning method		V+Ü		
Examination	Prüfungszeiten	Type of examination		
Final exam of module				
	At the End of the Semester	Hands-on exercises / written exam or oral exam		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SuSe	42
Exercises		1	SuSe	14
Total module attendance time				56 h

inf401 - Foundations of Theoretical Computer Science

Module label	Foundations of Theoretical Computer Science
Module code	inf401
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Wehrheim, Heike (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	
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
- know the relevance of NP-complete problem

Methodological competence

The students:

- learn about the power of abstract models of computation
- know problems which are not efficiently solvable and can detect these in practical tasks

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.

Recommended reading

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	Useful prerequisites: set theory, functions, relations, propositional and predicate logic

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		1	WiSe	14
Total module attendance time				56 h

inf420 - Introduction to IT-Security

Module label	Introduction to IT-Security
Module code	inf420
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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 (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
Responsible persons	<ul style="list-style-type: none">• Peter, Andreas (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	
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.

Recommended reading

- 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

Examination	Prüfungszeiten	Type of examination
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Final exam of module

Written or oral exam

The concretely chosen form of examination will be announced in the first week of the course.

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	2
Exercises		2	WiSe	2
Total module attendance time				4 h

inf518 - Foundations of Energy Informatics

Module label	Foundations of Energy Informatics
Module code	inf518
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Lehrenden, Die im Modul (authorised to take exams)• 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

Recommended reading

- Hofmann, Lutz: *Elektrische Energieversorgung* Band 1 & 2. Berlin, De Gruyter Oldenbourg, 2019, DOI: 10.1515/9783110548532 / 10.1515/9783110548600
- V. Crastan: *Elektrische Energieversorgung 2* (Energiewirtschaft und Klimaschutz, Elektrizitätswirtschaft und Liberalisierung, Kraftwerkstechnik und alternative Stromversorgung, chemische Energiespeicherung), Springer Vieweg, 4. Auflage, 2016
- Weitere, aktuelle Literatur wird in der Vorlesung bekannt gegeben.

Links		
Languages of instruction	German, English	
Duration (semesters)	1 Semester	
Module frequency	every summer term	
Module capacity	20	
Teaching/Learning method	V+Ü	
Examination	Prüfungszeiten	Type of examination
Final exam of module	During the semester	Portfolio

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercises		2	SuSe	28
Total module attendance time				56 h

inf521 - Medical Informatics

Module label	Medical Informatics
Module code	inf521
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Wulff, Antje (module responsibility)• Kaspar, Mathias (Module counselling)• Lehrenden, Die im Modul (authorised to take exams)

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

Recommended reading

- 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	V+Ü

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercises		2	SuSe	28
Total module attendance time				56 h

inf528 - Introduction to Medical Informatics

Module label	Introduction to Medical Informatics
Module code	inf528
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Wulff, Antje (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)

Prerequisites

No specific prior knowledge is required

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

Methological 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.

Recommended reading

Will be announced in the course

Links	
Languages of instruction	German, English
Duration (semesters)	1 Semester
Module frequency	every winter term
Module capacity	unlimited
Teaching/Learning method	V+Ü

Examination	Prüfungszeiten	Type of examination
Final exam of module	at the end of the lecture period	Written or oral exam
		The chosen form of examination will be announced in the first week of the course

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Total module attendance time				56 h

inf529 - Big Data in Medicine

Module label	Big Data in Medicine
Module code	inf529
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Wulff, Antje (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	No specific prior knowledge is required

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, technologies 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) technologies, and processing and presentation options.

Recommended reading

Ralf Otte, Boris Wippermann, Sebastian Schade, Viktor Otte – Von Data Mining bis Big Data, Handbuch für die industrielle Praxis. HANSER, ISBN:

9783446455504

Detlev Frick, Andreas Gadatsch, Jens Kaufmann, Birgit Lankes, Christoph Quix, Andreas Schmidt, Uwe Schmitz (Hrsg.) – Data Science, Konzepte, Erfahrungen, Fallstudien und Praxis. Springer Vieweg, 978-3658334024

Holm Landrock, Andreas Gadatsch – Big Data im Gesundheitswesen kompakt, Konzepte, Lösungen, Visionen. Springer Vieweg, 978-3-658-21096-0

Further will be announced in the course

Links		
Languages of instruction	German, English	
Duration (semesters)	1 Semester	
Module frequency	every summer term	
Module capacity	unlimited	
Teaching/Learning method	V+Ü or PR	
Examination	Prüfungszeiten	Type of examination
Final exam of module	at the end of the lecture period	Written or oral exam
		The chosen form of examination will be announced in the first week of the course

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercise or project		2	SuSe	28
Total module attendance time				56 h

inf530 - Artificial Intelligence

Module label	Artificial Intelligence
Module code	inf530
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Sauer, Jürgen (module responsibility)• Kramer, Oliver (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	<ul style="list-style-type: none">• Basic knowledge of computer science/business informatics
Skills to be acquired in this module	<p>Learning Objectives Students are familiar with key concepts, methods, and application areas of Artificial Intelligence. They understand fundamental learning methods such as KNN, K-Means, and neural networks, as well as modern concepts like Transformers, LLMs, and prompting. They are able to implement models in Python, evaluate their performance, and assess their generalization. Students understand how agent-based AI systems work and grasp the basics of reinforcement learning. They confidently apply AI methods to new problems and reflect on their ethical and societal implications.</p> <p>Subject-Specific Competencies Students: - explain key concepts of AI, machine learning, and neural networks, - distinguish between supervised and unsupervised learning methods, - describe how Transformers, LLMs, and prompting techniques work, - identify fundamental principles of reinforcement learning, - analyze strengths and weaknesses of various AI methods.</p> <p>Methodological Competencies Students: - practically apply AI models in Python (e.g., using scikit-learn, Keras, Hugging Face), - evaluate models using appropriate metrics (e.g., accuracy, precision), - develop and test their own prompting strategies, - assess the transferability of methods to new tasks, - compare and optimize AI methods for specific applications.</p> <p>Social Competencies Students: - collaborate on practical AI projects, - critically discuss results within a team, - present solutions tailored to specific audiences.</p> <p>Personal Competencies Students: - reflect on the use of AI methods in their own projects, - recognize the ethical implications of current AI systems, - develop awareness of the opportunities and limitations of generative AI.</p>
Module contents	<ul style="list-style-type: none">- Fundamentals of Artificial Intelligence- Machine Learning- Deep Learning

- Transformer Models and Large Language Models (LLMs)
- Prompting and Agent-Based AI
- Reinforcement Learning
- Practical Implementation in Python

Recommended reading

- Introduction to Statistical Learning — Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani
- Dive into Deep Learning — Aston Zhang, Zachary C. Lipton, Mu Li, Alexander J. Smola
- Pattern Recognition and Machine Learning — Christopher M. Bishop
- Deep Learning — Ian Goodfellow, Yoshua Bengio, Aaron Courville
- Artificial Intelligence: A Modern Approach — Stuart Russell, Peter Norvig

Links

Languages of instruction	German, English
Duration (semesters)	1 Semester
Module frequency	annual
Module capacity	unlimited
Teaching/Learning method	V+Ü

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercises		2	SuSe	28
Total module attendance time				56 h

inf600 - Business Informatics I

Module label	Business Informatics I
Module code	inf600
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Sauer, Jürgen (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	No participant requirements
Skills to be acquired in this module	<p>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.</p> <p>Professional competence The students:</p> <ul style="list-style-type: none">• 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 <p>Methodological competence The students:</p> <ul style="list-style-type: none">• 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 <p>Social competence The students:</p> <ul style="list-style-type: none">• present their solutions in front of other groups• discuss their outcomes <p>Self-competence The students:</p> <ul style="list-style-type: none">• 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.

Recommended reading

- 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

Examination	Prüfungszeiten	Type of examination
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Final exam of module

At the end of the lecture period
 Tasks and active partaking during the exercises / written exam or oral exam

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Exercises		2	WiSe	28
Total module attendance time				56 h

inf608 - eBusiness

Module label	eBusiness
Module code	inf608
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Marx Gómez, Jorge (module responsibility)• Bremer-Rapp, Barbara (module responsibility)• Solsbach, Andreas (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)

Prerequisites

recommended previous knowledge:

- topics discussed in inf601 Business Informatics II

There are no formal requirements for participation.

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 conceptualites 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-to-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)

Recommended reading

- Tobias Kollmann (2022): Digital Business - Grundlagen von Geschäftsmodellen und -prozessen in der Digitalen Wirtschaft. 8., überarbeitete Auflage, Springer Gabler.
- Andreas Meier und Henrik Stormer (2012): eBusiness & eCommerce. Management der digitalen Wertschöpfungskette. 3. Auflage, Springer Gabler.
- Bernd W. Wirtz (2013): Electronic Business. 4. Auflage, Springer Gabler.

Links

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

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	sommer term
Module capacity	unlimited
Teaching/Learning method	V+Ü

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercises		2	SuSe	28
Total module attendance time				56 h

inf701 - Computer Science Education II

Module label	Computer Science Education II
Module code	inf701
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none">• 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
Responsible persons	<ul style="list-style-type: none">• Diethelm, Ira (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)

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

Recommended reading

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

2005

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

Links

<http://elearning.uni-oldenburg.de>

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	annual
Module capacity	unlimited
Teaching/Learning method	S

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

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		4	WiSe	56
Exercises		2	WiSe	0
Total module attendance time				56 h

inf714 - Special Topics in Computer Science for Education

Module label	Special Topics in Computer Science for Education
Module code	inf714
Credit points	3.0 KP
Workload	90 h
Applicability of the module	<ul style="list-style-type: none">• Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule
Responsible persons	<ul style="list-style-type: none">• Diethelm, Ira (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
Prerequisites	keine Teilnehmervoraussetzungen

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 schulrelevanten 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			
Recommended reading			
Links			
Language of instruction	German		
Duration (semesters)	1 Semester		
Module frequency	unregelmäßig		
Module capacity	unlimited		
Teaching/Learning method	V oder S		
Examination	Prüfungszeiten	Type of examination	
Final exam of module	Am Ende der Vorlesungszeit nach Absprache mit dem Lehrenden		PF
Type of course	Seminar		
SWS	0		
Frequency	see frequency of module offering		

inf851 - Computer Science and Society

Module label	Computer Science and Society
Module code	inf851
Credit points	6.0 KP
Workload	180 h
Applicability of the module	

- 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

Responsible persons

- Diethelm, Ira (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

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

Recommended reading

- 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

V+S

Examination

Prüfungszeiten

Type of examination

Final exam of module

During semester and at the end

Portfolio (5-6 partial performances)

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Seminar		2	WiSe	28
Total module attendance time				56 h

wir806 - Information Technology Law

Module label	Information Technology Law
Module code	wir806
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none"> • 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, Economics and Law (Master) > Basismodule • Master's Programme Business Administration, Economics and Law (Master) > Mantelmodule (MPO2020) • Master's Programme Business Administration, Economics and Law (Master) > Schwerpunktmodule RdW - Recht • 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
Responsible persons	<ul style="list-style-type: none"> • Rott, Peter (module responsibility) • Lehrenden, Die im Modul (authorised to take exams) • Rott, Peter (Module counselling)
Prerequisites	not applicable
Skills to be acquired in this module	<p>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</p>
Module contents	<p>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.</p>
Recommended reading	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				
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		2		28
Total module attendance time				56 h

Abschlussmodul

mam - Master Thesis and Colloquium

Module label	Master Thesis and Colloquium
Module code	mam
Credit points	21.0 KP
Workload	630 h
Applicability of the module	<ul style="list-style-type: none">• Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Abschlussmodul
Responsible persons	<ul style="list-style-type: none">• Diethelm, Ira (module responsibility)• Lehrenden, Die im Modul (authorised to take exams)
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 content-related. 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 data models
- 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.

Recommended reading

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	S

Examination	Prüfungszeiten	Type of examination
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Final exam of module

Masterthesis, presentation and discussion

Type of course	Seminar
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SWS	0
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Frequency	SuSe and WiSe
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