

Subdivided Module Catalogue
for the Subject
Computer Science
as a Bachelor's with 1 major
with the degree "Bachelor of Science"
(180 ECTS credits)

Examination regulations version: 2007
Responsible: Institute of Computer Science

Course of Studies - Contents and Objectives

The bachelor of science in computer science combining theoretical and practical elements is the first degree level offered by the Department of Mathematics and Computer Science at the Maximilian University of Würzburg.

The aim of this degree is to teach students the most important aspects of computer science, to understand the theory of algorithms and their application as well as to improve analytical skills, the ability to think in abstract terms and structure complex problems. With this degree the students have the skills to either continue their studies in a consecutive Master of Science program or be able to apply their knowledge in one of the many fields of computer science present outside academia. This is complemented by a specialization field in which the students become familiar with the basic techniques and ways of thinking in a subject of their choice for which methods of computer science are used. The bachelor program focuses on well established and fundamental knowledge of facts and methods as well as on the development of thought processes necessary for computer science. Furthermore, state-of-the-art methods and their relevant applications are taught.

With the bachelor thesis, students demonstrate their ability to work on a specific task and use the scientific methods learned within a defined period of time. Though guided by a mentor, they largely carry out the selected project on their own.

The bachelor is an internationally acknowledged degree in the field of computer science that demonstrates the ability to work in this field or continue on to obtain a higher degree.

Abbreviations used

Course types: **E** = field trip, **K** = colloquium, **O** = conversatorium, **P** = placement/lab course, **R** = project, **S** = seminar, **T** = tutorial, **Ü** = exercise, **V** = lecture

Term: **SS** = summer semester, **WS** = winter semester

Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed

Regulations: **(L)ASPO** = general academic and examination regulations (for teaching-degree programmes), **FSB** = subject-specific provisions, **SFB** = list of modules

Other: **A** = thesis, **LV** = course(s), **PL** = assessment(s), **TN** = participants, **VL** = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

ASPO2007

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

19-Aug-2008 (2008-25)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.

The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Compulsory Courses (100 ECTS credits)				
Computer Science (69 ECTS credits)				
10-I-IÜ-072-m01	Information transmission	8	NUM	30
10-I-RAL-072-m01	Digital computer systems	8	NUM	43
10-I-TI-072-m01	Theoretical informatics	8	NUM	50
10-I-ADS-072-m01	Algorithm and data structures	8	NUM	6
10-I-HWP-072-m01	Practical course in hardware	10	B/NB	29
10-I-PP-072-m01	Practical course in programming	9	B/NB	42
10-I-ST-072-m01	Software technology	8	NUM	48
10-I-SWP-072-m01	Practical course in software	10	B/NB	47
Basics of Mathematics (31 ECTS credits)				
10-I-LOG-072-m01	Logic for informatics	5	NUM	33
10-M-INF1-072-m01	Mathematics 1 for students in Computer Science	10	NUM	34
10-M-INF2-072-m01	Mathematics 2 for students in Computer Science	8	NUM	35
10-M-INF3-072-m01	Mathematics 3 for students in Computer Science	8	NUM	36
Compulsory Electives (48 ECTS credits)				
Computer Science (38 ECTS credits)				
10-I-AR-072-m01	Automation and control technology	8	NUM	8
10-I-BS-072-m01	Operating systems	5	NUM	13
10-I-DB-072-m01	Data bases	5	NUM	16
10-I-GT-072-m01	Graphtheoretical concepts and algorithms	8	NUM	27
10-I-KT-072-m01	Theory of complexity	8	NUM	32
10-I-OOP-072-m01	Object oriented programming	5	NUM	39
10-I-RAK-072-m01	Computer architecture	5	NUM	44
10-I-RK-072-m01	Computer networks and communication systems	8	NUM	45
10-I-WMS-072-m01	Knowledge management systems and data mining	10	NUM	51
07-I-BI-072-m01	Bioinformatics	5	NUM	14
Subsidiary Subjects Application-oriented Students must achieve all ECTS credits that are required in the application-oriented subject in a single one of the specified application-oriented subjects (i. e. for example in Wirtschaftswissenschaft (Business Management and Economics)).				
Subsidiary Subjects Application-oriented Subject Linguistics (max. 10 ECTS credits)				
05-DTPH-SPR1-072-m01	Level One Module Linguistics	5	NUM	11
05-DTPH-SPR2-072-m01	Level Two Module Linguistics	5	NUM	7
Subsidiary Subjects Application-oriented Subject Business Management and Economics (max. 10 ECTS credits)				
12-BPL-G-072-m01	Supply, Production and Operations Management. An Introduction	5	NUM	12
12-IntUR-G-072-m01	Managerial Accounting	5	NUM	31
12-I&F-G-072-m01	Investment and Finance. An Introduction	5	NUM	28
12-ExtUR-G-072-m01	Financial Accounting	5	NUM	22
12-EBWL-G-072-m01	Introduction to Business Administration	5	NUM	17
12-EWiinf-G-072-m01	Introduction to Business Informatics	5	NUM	20
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12-GP-G-072-m01	Business Processes	5	NUM	25
12-FRBE-F-072-m01	Forward and Reverse Business Engineering	5	NUM	24
Subsidiary Subjects Application-oriented Subject Mathematics				
10-M-ODE-082-m01	Ordinary Differential Equations	5	NUM	26
10-M-NM1-072-m01	Numerical Mathematics 1	8	NUM	38
10-M-ST1-072-m01	Stochastics 1	8	NUM	49
10-M-COM-072-m01	Computeroriented Mathematics	3	B/NB	15
10-M-EDM-072-m01	Introduction to Discrete Mathematics	5	NUM	18
10-M-ORS-072-m01	Operations Research	5	NUM	40
10-M-EZT-072-m01	Introduction to Number Theory	5	NUM	21
Subsidiary Subjects Application-oriented Subject Physics				
11-EFNF-072-m01	Introduction to Physics for Students of Non-physics-related Minor Subjects	7	NUM	19
11-PFNF-072-m01	Practical Course Physics for Students of Non-physics-related Minor Subjects	3	B/NB	41
Subsidiary Subjects Application-oriented Subject Geography (max. 10 ECTS credits)				
09-FERN-072-m01	Remote Sensing	10	NUM	23
Subsidiary Subjects Application-oriented Subject Medicine (max. 10 ECTS credits)				
03-M-MEI-072-m01	Medical decision making	10	NUM	37
Thesis (12 ECTS credits)				
10-I-BA-072-m01	Bachelor-Thesis	12	NUM	9
Subject-specific Key Skills (12 ECTS credits)				
10-I-BK-072-m01	Bachelor-Kolloquium	2	NUM	10
10-I-SEM1-072-m01	Seminar 1	5	NUM	46

Module title		Abbreviation
Algorithm and data structures		10-I-ADS-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.		
Intended learning outcomes		
[Version 1: The students are able to independently design algorithms as well as to precisely describe and analyse them. They are able to apply recursion in algorithms and data structures. The students are familiar with the three basic programming paradigms and are able to apply them in practical programs.] [Version 2: The students are able to independently design algorithms as well as to precisely describe and analyse them. The students are familiar with the basic paradigms of the design of algorithms and are able to apply them in practical programs. The students are able to estimate the run-time behaviour of algorithms and to prove their correctness.]		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Level Two Module Linguistics		05-DTPH-SPR2-072-m01
Module coordinator		Module offered by
holder of the Chair of German Linguistics		Institute of German Studies
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to the syntax of modern German, consolidation of skills concerning the word formation and syntax analysis.		
Intended learning outcomes		
Students possess basic knowledge concerning the syntax of modern German as well as the ability to perform complex analyses of syntax and of word formation on modern texts.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> • 05-DTPH-SPR2-1-072: S (no information on SWS (weekly contact hours) and course language available) • 05-DTPH-SPR2-2-072: Ü (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 05-DTPH-SPR2-1-072: Syntax and word formation 1 <ul style="list-style-type: none"> • 3 ECTS, Method of grading: numerical grade • written examination (90 minutes) Assessment in module component 05-DTPH-SPR2-2-072: Syntax and word formation 2 <ul style="list-style-type: none"> • 2 ECTS, Method of grading: numerical grade • written examination (90 minutes) 		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Automation and control technology		10-I-AR-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science VII		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Overview of control and automation systems, fundamental principles of control technology, Laplace transformation, transfer function, plant, controller types, basic feedback loop, fundamental principles of control engineering, automata, structure of Petri nets, Petri nets for automisation, machine-related structure of processing computation machines, communication between process computers and periphery devices, software for automation systems, process synchronisation, process communication, real-time operating systems, real-time planning.		
Intended learning outcomes		
The students master the fundamentals of automation and control.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Bachelor-Thesis		10-I-BA-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
12	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Registration for assessment: as specified.
Contents		
Largely independently researching and writing on an experimental or theoretical topic in computer science, using known methods and adhering to the principles of good scientific practice.		
Intended learning outcomes		
The students are able to largely independently research and write on an experimental or theoretical topic in computer science, applying known methods and adhering to the principles of good scientific practice, and to write a Bachelor's thesis.		
Courses (type, number of weekly contact hours, language — if other than German)		
no courses assigned		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written thesis Language of assessment: German or English		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Bachelor-Kolloquium		10-I-BK-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
2	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Presentation and defence of the results of the Bachelor's thesis in an open discussion.		
Intended learning outcomes		
The students are able to present the results of their Bachelor's theses and defend them in a discussion.		
Courses (type, number of weekly contact hours, language — if other than German)		
K (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
oral presentation (talk maximum 30 minutes, approx. 30 to 40 minutes total) with subsequent discussion of Bachelor's thesis and adjacent fields		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Level One Module Linguistics		05-DTPH-SPR1-072-m01
Module coordinator		Module offered by
holder of the Chair of German Linguistics		Institute of German Studies
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to the basics of German linguistics (linguistic theory and history, communication, theory of semiotics, semantics and pragmatics; phonetics, phonology, graphemics and word formation.		
Intended learning outcomes		
Students possess basic knowledge of the area of German linguistics with focus on phonetics, phonology, graphemics and word formation		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (90 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title			Abbreviation
Supply, Production and Operations Management. An Introduction			12-BPL-G-072-m01
Module coordinator		Module offered by	
holder of the Chair of Business Management and Industrial Management		Faculty of Business Management and Economics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
This course will provide students with an overview of fundamental processes in procurement, production and logistics and the related corporate functions as well as a model-based introduction to related planning procedures.			
Intended learning outcomes			
The students will be able to describe and discuss the objectives and major processes in the domains of corporate procurement, production and logistics as well as their interdependencies. Furthermore, they are capable of developing and applying basic planning models in these fields.			
Courses (type, number of weekly contact hours, language — if other than German)			
V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)			
written examination (approx. 60 minutes)			
Allocation of places			
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Additional information			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module title		Abbreviation
Operating systems		10-I-BS-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science II		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Batch, time sharing, real-time virtual machines, system calls, processes and threads, cooperating processes, schedulers, process synchronisation, semaphores, monitors, critical regions, deadlocks, dynamic memory management, segmentation, paging, file systems, interfaces, directory structure, network file systems, hard drive organisation, basics of MS operating systems.		
Intended learning outcomes		
The students possess knowledge and practical skills in building and using essential parts of operating systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Bioinformatics		07-l-BI-072-m01
Module coordinator		Module offered by
holder of the Chair of Bioinformatics		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Fundamental principles of bioinformatics.		
Intended learning outcomes		
Students are proficient in methods for the analysis of DNA and protein databases.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (45 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Computeroriented Mathematics		10-M-COM-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to modern mathematical software for symobc computation (e. g. Mathematica or Maple) and numerical computation (e. g. Matlab) to supplement the basic modules in analysis and linear algebra (10-M-ANA and 10-M-LNA). Computer-based solution of problems in linear algebra, geometry, analysis, in particular differential and integral calculus; visualisation of functions.		
Intended learning outcomes		
The student learns the use of advanced modern mathematical software packages, and is able to assess their fields of application to solve mathematical problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
project in the form of programming exercises (expenditure of time as specified at the beginning of the course)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Data bases		10-I-DB-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Relational algebra and complex SQL statements; database planning and normal forms; xml data modelling; transaction management.		
Intended learning outcomes		
The students possess a knowledge about database modelling and queries in SQL, transactions as well as easy data modelling in XML.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Introduction to Business Administration		12-EBWL-G-072-m01
Module coordinator		Module offered by
holder of the Chair of Human Resource Management and Organisation		Faculty of Business Management and Economics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>This course will introduce students to relevant subject areas of business administration. Students will acquire an overview of the different perspectives and main points of view from which a theoretical examination of business enterprise may take place. The course will focus on what companies or other organisations are, how they behave and in what form they are organised. For this purpose, a study will be made of the economic subject's decision-making behaviour.</p> <p>Reading list to be provided during lecture.</p>		
Intended learning outcomes		
<p>The aim of the lectures is to familiarise the students with the basic problem issues and perspectives within the field of business administration.</p>		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Introduction to Discrete Mathematics		10-M-EDM-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Techniques from combinatorics, introduction to graph theory (including applications), cryptographic methods, error-correcting codes.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and results in discrete mathematics, masters the relevant proof techniques, is able to apply methods from number theory and algebra to discrete mathematics and realises the scope of applications of discrete structures.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie		

Module title		Abbreviation
Introduction to Physics for Students of Non-physics-related Minor Subjects		11-EFNF-072-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
7	numerical grade	--
Duration	Module level	Other prerequisites
2 semester	undergraduate	--
Contents		
Mechanics, vibration theory, thermodynamics, optics, science of electricity, Atomic and Nuclear Physics.		
Intended learning outcomes		
The students have knowledge of the principles of Physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 120 minutes)		
Allocation of places		
Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.		
Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title			Abbreviation
Introduction to Business Informatics			12-EWiinf-G-072-m01
Module coordinator		Module offered by	
holder of the Chair of Business Management and Business Information Systems		Faculty of Business Management and Economics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
<p>Content:</p> <p>This course offers an introduction to the essential aspects of business information systems.</p> <p>Outline of syllabus:</p> <ol style="list-style-type: none">1. Integration of IT systems2. From data processing to information processing3. eCommerce and eGovernment4. Functionality of IT technology5. Application development principles6. Intercommunication <p>Reading:</p> <p>Thome: Grundzüge der Wirtschaftsinformatik.</p>			
Intended learning outcomes			
<p>The course "Einführung in die Wirtschaftsinformatik" communicates</p> <p>(i) an overview of the different task fields of the business informations systems discipline;</p> <p>(ii) an understanding for recent developments in the discipline and related technologies.</p>			
Courses (type, number of weekly contact hours, language — if other than German)			
V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)			
written examination (60 minutes)			
Allocation of places			
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Additional information			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module title		Abbreviation
Introduction to Number Theory		10-M-EZT-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Elementary properties of divisability, prime numbers and prime number factorisation, modular arithmetics, prime tests and methods for factorisation, structure of the residue class rings, theory of quadratic remainder, quadratic forms, diophantine approximation and diophantine equations.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and methods of elementary number theory. He/She is able to apply these methods to practical problems, e.g., in cryptography.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) written examination (90 minutes; usually chosen) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Financial Accounting		12-ExtUR-G-072-m01
Module coordinator		Module offered by
holder of the Chair of Business Taxation		Faculty of Business Management and Economics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This course offers an introduction to the fundamentals of financial accounting, including the technique of double-entry book-keeping as well as the fundamentals of recognition, valuation and presentation of assets, liabilities and equity according to German commercial law.		
Intended learning outcomes		
Students acquire a basic understanding of the fundamentals of financial accounting. They are able to arrange, reproduce and apply this knowledge, i.e. they are able to solve simple accounting problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Remote Sensing		09-FERN-072-m01
Module coordinator		Module offered by
holder of the Chair of Remote Sensing		Institute of Geography and Geology
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to "Geographical Remote Sensing", applications of "Remote Sensing" to Geography.		
Intended learning outcomes		
Students possess the following skills: theoretical principles of the Remote Sensing System, knowledge of current geographical fields of application of cross-sectional methodology, remote sensing in the light of different sensor and platform specifications.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> • 09-FERN-1-072: V + T (no information on SWS (weekly contact hours) and course language available) • 09-FERN-2-072: V + T (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component 09-FERN-1-072: Introduction to Geographical Remote Sensing Introduction to Geographical Remote Sensing <ul style="list-style-type: none"> • 5 ECTS, Method of grading: numerical grade • written examination (45 minutes) 		
Assessment in module component 09-FERN-2-072: Application of Remote Sensing in Geography Application of Remote Sensing in Geography <ul style="list-style-type: none"> • 5 ECTS, Method of grading: numerical grade • written examination (45 minutes) 		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Forward and Reverse Business Engineering		12-FRBE-F-072-m01
Module coordinator		Module offered by
Business Integration Prof. Thome		Faculty of Business Management and Economics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>"Business Engineering" refers to the method and model-based design theory for companies in the information age. "Forward" refers to design methods (such as situation analysis, requirements analysis and business process modelling) that help implement a new solution. "Reverse" refers to approaches (such as the use and process analysis) that make it possible to improve or re-design existing structures and processes. Market requirements and technological innovation potential are typical reasons for the continuous transformation of a company. The resulting change needs to be implemented into the organisational structure, business processes and information systems.</p> <p>The course traces the implementation cycle of enterprise software from the point of view of a member of a project team. In addition to acquainting students with the theoretical basis of adaptation, the course will also discuss examples from practical projects.</p>		
Intended learning outcomes		
The students know in detail the process of adaptation of business software libraries. They master the methods of Forward Engineering (such as situation analysis, requirement analysis, process modeling and business blueprint) and Reverse Engineering (Reverse Business Engineering) and their implementation in tools.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
Number of places: 50. Bachelor's students of Wirtschaftsinformatik (Business Information Systems) (180 ECTS credits) will be given preferential consideration when it comes to admission to courses and assessment in the module component. Uniform regulations governing the restriction of the number of places are laid down in the FSB (subject-specific provisions) regarding Section 7 Subsection 4.		
Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title			Abbreviation
Business Processes			12-GP-G-072-m01
Module coordinator		Module offered by	
holder of the Chair of Business Management and Business Information Systems		Faculty of Business Management and Economics	
ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	
Contents			
<p>This course is aimed at students of Wirtschaftsinformatik (Business Information Systems) and Wirtschaftswissenschaft (Business Management and Economics) interested in the topic. The course is divided up into two parts. In the theoretical part, students will acquire the necessary theoretical knowledge that will serve as a basis for the practical part. The practical exercise will present students with an opportunity to apply their newly acquired knowledge by working with an SAP Business ByDesign system on case studies on the model company Al-mika. In this context, the human resources, purchasing, sales, service, project management and finance departments will be dealt with.</p> <p>The course will introduce students to business processes of an ERP system (Enterprise Resource Planning) using the example of SAP Business ByDesign. In addition to the basic principles, students will also become familiar with the processes and functionalities.</p>			
Intended learning outcomes			
<p>After completing the course, the students will be able to</p> <ol style="list-style-type: none">1. reflect technical principles and operational models of ERP systems,2. understand the functionality of ERP systems and3. perform and understand business processes within the ERP system SAP Business ByDesign.			
Courses (type, number of weekly contact hours, language — if other than German)			
V + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)			
written examination (approx. 60 minutes)			
Allocation of places			
<p>Number of places: 30. Bachelor's students of Wirtschaftsinformatik (Business Information Systems) (180 ECTS credits) will be given preferential consideration when it comes to admission to courses and assessment in the module component. Uniform regulations governing the restriction of the number of places are laid down in the FSB (subject-specific provisions) regarding Section 7 Subsection 4.</p>			
Additional information			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module title		Abbreviation
Ordinary Differential Equations		10-M-ODE-o82-mo1
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Existence and uniqueness theorem, continuous dependance of solutions on initial values, systems of linear differential equations, matrix exponential series, linear differential equations of higher order.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and methods of the theory of ordinary differential equations. He/she is able to apply these methods to practical problems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Graphtheoretical concepts and algorithms		10-I-GT-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science I		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
[Version 1: Paths, cycles and components, colouring and matching, transitive hull and irreducible kernel, trees, forests and matroids, depth first search, breadth first search, shortest paths, flows and streams, matchings, network design and routing, planar graphs, graph transformations] [Version 2: On the one hand, we handle typical graph problems: we solve round trip problems, calculate maximal flows, find matchings and colourings, work with planar graphs and find out how the ranking algorithm of Google works. On the other hand, we become familiar with new concepts, using the examples of graph problems, for example how we model problems as linear programs or how we show that they are fixed parameter computable.]		
Intended learning outcomes		
[Version 1: The students master the following topics: the most important graph theoretical concepts and algorithms: paths, cycles and components, colourings and matching, transitive hull and irreducible kernel, trees, forests, matroids, depth first search, breadth first search, shortest path, flows and streams, matching, network design and routing, planar graphs, graph transformations.] [Version 2: The students are able to model typical problems of computer science as graph problems. In addition, the participants are able to decide which tool from the lecture helps solve a given graph problem algorithmically. In this course, students learn in detail how to estimate the run time of given graph algorithms.]		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Investment and Finance. An Introduction		12-I&F-G-072-m01
Module coordinator		Module offered by
holder of the Chair of Business Management, Banking and Finance		Faculty of Business Management and Economics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>Content: This course offers an introduction to principles of financial mathematics, several methods of capital budgeting and principles of financial economics.</p> <p>Outline of syllabus:</p> <ol style="list-style-type: none"> 1. Principles of financial mathematics 2. Fundamental concepts 3. Problems of investment and finance in one commodity world under certainty 4. Problems of investment and finance in one commodity world under uncertainty 5. Problems of investment and finance in many commodities world under uncertainty 6. Capital market and corporate financing in Germany 		
Intended learning outcomes		
<p>After completing the course "Principles of Investments and Finance", the students will be able</p> <p>(i) to understand the fundamentals in financial mathematics and solve several problems, e.g. via the PV approach;</p> <p>(ii) to address the central problems in intertemporal allocation given different capital market scenarios;</p> <p>(iii) to budget and calculate the optimal useful life given static and dynamic investment approaches under the consideration of several other investment opportunities and the capital market scenario, especially the influence of taxes.</p>		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Practical course in hardware		10-I-HWP-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
10	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Practical experiments on hardware aspects, for example in communication technology, robots or the structure of a complete microprocessor.		
Intended learning outcomes		
The students are able to independently review, prepare and perform experiments with the help of experiment descriptions, to independently search for additional information as well as to document and evaluate experiment results.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
completion of project assignments including submission of logs (project results and project documentation as specified in assignment), final presentation (10 to 15 minutes per group)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Information transmission		10-I-IÜ-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science III		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to probability calculus, coding theory, coding for fault detection and fault correction, information theory, spectrum and Fourier transform, modulation technique, structure of digital transmission systems, introduction to the structure of computer networks, communication protocols.		
Intended learning outcomes		
The students possess a technical, theoretical and practical knowledge of the structure of systems for information transmission, a knowledge that is necessary to understand these systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Managerial Accounting		12-IntUR-G-072-m01
Module coordinator		Module offered by
holder of the Chair of Business Management and Accounting		Faculty of Business Management and Economics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>Content: This course offers an introduction to aims and methods of managerial accounting (cost accounting).</p> <p>Outline of syllabus:</p> <ol style="list-style-type: none"> 1. Managerial accounting and financial accounting 2. Managerial accounting: basic terms 3. Different types of costs 4. Cost centre accounting based on total costs 5. Job costing based on total costs 6. Cost centre accounting and job costing based on direct/variable costs 7. Budgeting and cost-variance analysis 8. Cost-volume-profit analysis 9. Cost information and operating decisions <p>Reading: Coenenberg/Fischer/Günther: Kostenrechnung und Kostenanalyse, Stuttgart. Friedl/Hofmann/Pedell: Kostenrechnung. Eine entscheidungsorientierte Einführung. (most recent editions)</p>		
Intended learning outcomes		
<p>After completing the course "Management Accounting and Control", the students will be able to</p> <ol style="list-style-type: none"> (i) set out the responsibilities of the company's internal accounting and control; (ii) define the central concepts of internal enterprise computing restriction and control and assign case studies the terms; (iii) apply the basic methods of internal corporate accounting and control on a full and cost base to idealized case studies of medium difficulty that calculate relevant costs and benefits and take on this basis a reasoned decision. 		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Theory of complexity		10-I-KT-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science IV		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.		
Intended learning outcomes		
[Version 1: The students possess a fundamental and applicable knowledge in the areas of complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.] [Version 2: The students possess a fundamental and applicable knowledge in the areas of complexity measurements and classes, memory consumption versus computation time, determinism versus indeterminism, P-NP problem, completeness problems, lower bounds, Boolean hierarchy, polynomial time hierarchy, complexity of parallel algorithms and complexity of probabilistic algorithms.]		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Logic for informatics		10-I-LOG-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.		
Intended learning outcomes		
The students are proficient in the following areas: syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Mathematics 1 for students in Computer Science		10-M-INF1-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basics on numbers and functions, sequences and series, differential and integral calculus in one variable, vector spaces, simple differential equations.		
Intended learning outcomes		
The student gets acquainted with fundamental concepts and methods of mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in computer science, and is able to interpret the results.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (90 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Mathematics 2 for students in Computer Science		10-M-INF2-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis.		
Intended learning outcomes		
The student gets acquainted with fundamental concepts and methods of advanced mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in computer science, and is able to interpret the results.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (90 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Mathematics 3 for students in Computer Science		10-M-INF3-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Elementary algebra and number theory: cardinality of sets, relations, maps, groups, fields, residue class rings and polynomial rings, prime numbers, basics in cryptography. Discrete mathematics: graph theory, combinatorics, integral optimisation and algorithmic applications. Discrete stochastics: combinatorics, basic notions in probability theory, random variables, expected value and variance, independency, Bayes' law, important distribution functions, Markov chains, tests.		
Intended learning outcomes		
The student gets acquainted with fundamental concepts and methods of advanced mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in computer science, and is able to interpret the results.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (90 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Medical decision making		03-M-MEI-072-m01
Module coordinator		Module offered by
Dean of Studies Medizin (Medicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module will acquaint students with the fundamental principles of medical diagnostics and treatment and will apply these principles to the most important internal diseases. Students will work on casuistries presented on the computer in the form of virtual patients. The module will discuss the principles of medical word formation as well as the history and development of the language of medicine. It will explain medical word elements (prefixes, suffixes, genitive nouns, adjectives etc.) and will acquaint students with medical terminology. The course will also include exercises.		
Intended learning outcomes		
Students have developed a knowledge of fundamental medical terminology and medical decision making and are able to apply this knowledge to the example of internal medicine.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (60 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Numerical Mathematics 1		10-M-NM1-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration.		
Intended learning outcomes		
The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their typical fields of application.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) written examination (90 minutes; usually chosen) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Object oriented programming		10-I-OOP-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Polymorphism, generic programming, meta programming, web programming, templates, document management.		
Intended learning outcomes		
The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (50 minutes) or oral examination (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Operations Research		10-M-ORS-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.
Contents		
Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems.		
Intended learning outcomes		
The student is acquainted with the fundamental methods in operations research, as required as a central tool for solving many practical problems especially in economics. He/She is able to apply these methods to practical problems, both theoretically and numerically.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 73 (1) 5. Mathematik Angewandte Mathematik		

Module title		Abbreviation
Practical Course Physics for Students of Non-physics-related Minor Subjects		11-PFNF-072-m01
Module coordinator		Module offered by
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.		
Intended learning outcomes		
The students have knowledge of the principles of Physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) oral test (approx. 15 minutes) during experiment and b) ungraded written examination (approx. 90 minutes)		
Allocation of places		
Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.		
Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Practical course in programming		10-I-PP-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
9	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
The programming language Java. Independent creation of small to middle-sized, high-quality Java programs.		
Intended learning outcomes		
The students are able to independently develop small to middle-sized, high-quality Java programs.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
completion of programming exercises (expenditure of time as specified) and final examination: written examination (60 to 90 minutes) or oral examination (one candidate each: 10 to 15 minutes, groups of 2: 20 minutes, groups of 3: 30 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Digital computer systems		10-I-RAL-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science V		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Introduction to digital technologies, Boolean algebras, combinatory circuits, synchronous and asynchronous circuits, hardware description languages, structure of a simple processor, machine programming, memory hierarchy.		
Intended learning outcomes		
The students possess a knowledge of the fundamentals of digital technologies up to the design and programming of easy microprocessors as well as knowledge for the application of hardware description languages for the design of digital systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Computer architecture		10-I-RAK-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science V		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Instruction set architectures, command processing through pipelining, statical and dynamic instruction scheduling, caches, vector processors, multi-core processors.		
Intended learning outcomes		
The students master the most important techniques to design fast computers as well as their interaction with compilers and operating systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Computer networks and communication systems		10-I-RK-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science III		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Properties of computer and communication systems: data traffic in distributed systems. Performance analysis of computer networks and communication systems: problem statement and introduction to method architecture and structure of computer networks: network structure, network access, access methods, digital transfer hierarchies, dataflow control and traffic control, transfer network. Communication protocols: fundamental principles and ISO architecture models. Internet: structure and basic mechanism, TCP/IP, routing, network management. Mobile communication networks: fundamental concepts, GSM, UMTS. Future communication systems and networks.		
Intended learning outcomes		
The students possess an intricate knowledge of the structure of computer networks and communication systems as well as fundamental principles to rate these systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Seminar 1		10-I-SEM1-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Independent review of a current topic in computer science on the basis of literature and, where applicable, software with written and oral presentation. The topics in modules 10-I-SEM1 and 10-I-SEM2 must come from different areas (this usually means that they are assigned by different lecturers).		
Intended learning outcomes		
The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written elaboration and oral presentation with subsequent discussion on a topic from the field of computer science (type and length to be specified by the lecturer at the beginning of the course) Language of assessment: German, English if required by the examination candidate		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Practical course in software		10-I-SWP-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
10	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Completion of a project assignment in groups, problem analysis, creation of requirements specifications, specification of solution components (e. g. UML) and milestones, user manual, programming documentation, presentation and delivery of the runnable software product in a colloquium.		
Intended learning outcomes		
The students possess the practical skills for the design, development and execution of a software project in small teams.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
periodic presentations on project progress with regard to detailing problem specifications, the corresponding solution components (software) and the documentation of these; if project is completed in groups, proof of contributions made by the individual student required; software and project documentation as specified in assignment, final presentation (10 to 15 minutes per group)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Software technology		10-I-ST-072-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Object-oriented software development with UML, development of graphical user interfaces, foundations of databases and object-relational mapping, foundations of web programming (HTML, XML), software development processes, unified process, agile software development, project management, quality assurance.		
Intended learning outcomes		
The students possess a fundamental theoretical and practical knowledge on the design and development of software systems, in particular for the web.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Stochastics 1		10-M-ST1-072-m01
Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem.		
Intended learning outcomes		
The student is acquainted with fundamental concepts and methods in stochastics, applies these methods to practical problems and knows about the typical fields of application.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) written examination (90 minutes; usually chosen) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Theoretical informatics		10-I-TI-o72-m01
Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Computability, decidability, countability, complexity of calculations, Boolean functions and circuits, finite automata and regular sets, generative grammars, context-free languages, context-sensitive languages.		
Intended learning outcomes		
The students possess fundamental and applicable knowledge in the area of computability, decidability, countability, complexity of calculations, Boolean functions and circuits, finite automata and regular sets, generative grammars, context free languages, context sensitive languages.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module title		Abbreviation
Knowledge management systems and data mining		10-I-WMS-072-m01
Module coordinator		Module offered by
holder of the Chair of Computer Science VI		Institute of Computer Science
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>[Version 1: Foundations in the following areas: process and product-oriented knowledge management systems, basic knowledge representation and inference (rules, objects, constraints, probabilistic, non-monotonous, temporal closures), problem classes and solution methods (diagnostic, construction, simulation), knowledge acquisition and process models, data mining (data warehouse and OLAP, data preprocessing, data visualisation), learning algorithms with data mining (learning of decidability trees, rules, subgroups, clusters), semantic web.]</p> <p>[Version 2: Foundations in the following areas: process and product-oriented knowledge management systems, basic knowledge representation and inference (rules, objects, constraints, probabilistic, non-monotonous, temporal closure), solution methods (diagnostic, construction), knowledge acquisition and process models, semantic web.]</p>		
Intended learning outcomes		
The students possess the theoretical and practical knowledge necessary to understand and develop knowledge management systems and data mining systems including knowledge formalisation. The students also have acquired experience in a small project.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (80 minutes) or oral examination (one candidate each: 20 minutes, groups of 2: 30 minutes, groups of 3: 40 minutes)		
Allocation of places		
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Additional information		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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