Subdivided Module Catalogue

for the Subject

Computer Science

as vertieft studiertes Fach (studied with a focus on the scientific discipline)

with the degree "Erste Staatsprüfung für das Lehramt an Gymnasien"

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:

> **LASPO2009**

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

> **27-Feb-2013 (2013-31)**

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.

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The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Scientific Discipline (92 ECTS credits)				
Compulsory Courses (70 ECTS credits)				
10-I-ADS-102-m01	Algorithm and data structures	10	NUM	33
10-I-ST-102-m01	Software Technology	10	NUM	61
10-I-DB-102-m01	Databases	5	NUM	36
10-I-OOP-GY-102-m01	Object-Oriented Programming	5	NUM	53
10-I-PP-102-m01	Practical Course in Programming	10	B/NB	54
10-I-SWP-102-m01	Practical course in software	10	B/NB	63
10-I-TI-102-m01	Theoretical informatics	10	NUM	66
10-I-TEI1-102-m01	Technical Informatics 1	5	NUM	64
10-I-TEI2-102-m01	Technical Informatics 2	5	NUM	65
Compulsory Electives (22 ECTS credits)				
10-I-RAL-102-m01	Digital computer systems	10	NUM	55
10-I-IÜ-102-m01	Information Transmission	10	NUM	49
10-I-LOG-102-m01	Logic for informatics	6	NUM	52
10-I-HWP-102-m01	Practical Course in Hardware	10	B/NB	48
10-I-GT-102-m01	Algorithmic Graph Theory	5	NUM	46
10-I-WBS-102-m01	Knowledge-based Systems	5	NUM	67
10-I-DM-102-m01	Data Mining	5	NUM	40
10-I-KT-102-m01	Theory of Complexity	5	NUM	50
10-I-AR-102-m01	Automation and Control Technology	8	NUM	34
10-I-RK-102-m01	Computer Networks and Communication Systems	8	NUM	57
10-I-SEM1-072-m01	Seminar 1	5	NUM	59
10-I-SEM2-072-m01	Seminar 2	5	NUM	60
10-I-REP-GY-092-m01	Review Course in Informatics for the Staatsexamen (Gymnasium)	4	B/NB	56
10-I=DB2-102-m01	Databases II	5	NUM	13
10-I=DK-102-m01	Data Compression	8	NUM	15
10-I=PVS-102-m01	Programming of Distributed Systems	8	NUM	25
10-I=IR-102-m01	Information Retrieval	5	NUM	18
10-I=STM-102-m01	Natural Language Processing and Text Mining	5	NUM	31
10-I=KI-102-m01	Artificial Intelligence	8	NUM	20
10-I=ES-102-m01	Embedded Systems	8	NUM	17
10-I=EL-102-m01	E-Learning	5	NUM	16
10-I=RO-102-m01	Robotics	8	NUM	27
10-I=RO2-102-m01	Robotics II: Networked Robots	8	NUM	29
10-I=DDB-102-m01	Deductive Databases	8	NUM	14
10-I=LVS-102-m01	Analytical Performance Evaluation of Distributed Systems	8	NUM	22
10-I=ST-102-m01	Simulation Techniques for Performance Evaluation	8	NUM	30
10-I=AUT-102-m01	Automata Theory	5	NUM	10
10-I=BER-102-m01	Computability Theory	5	NUM	11
10-I=ML-102-m01	Mathematical Logic	5	NUM	23

10-I=KT2-122-m01	Advanced Topics in Computational Complexity	5	NUM	21
10-I=KD-102-m01	Cryptography and Data Security	5	NUM	19
10-I=AG-102-m01	Computational Geometry	5	NUM	7
10-I=APA-102-m01	Approximation Algorithms	5	NUM	9
10-I=VG-102-m01	Visualization of Graphs	5	NUM	32
10-I=AGIS-102-m01	Algorithms for Geographic Information Systems	5	NUM	8
10-I=CB-102-m01	Compiler Construction	8	NUM	12
10-I=PA-102-m01	Program Design and Analysis	5	NUM	24
10-I=RAM-102-m01	Computer Arithmetic	5	NUM	26
06-MK-MedInf1-102-m01	Computer Science in Media 1	6	NUM	5
06-MK-MedInf2-102-m01	Computer Science in Media 2	6	NUM	6
Teaching (10 ECTS credits)				
10-I-DDI1-092-m01	Didactics of Informatics 1	4	NUM	38
10-I-DDI2-092-m01	Didactics of Informatics 2	4	NUM	39
10-I-DPAI-092-m01	Practical Course in the Application of Informatics Systems from a Didactical Point of View	2	B/NB	42

Freier Bereich (general as well as subject-specific electives)

Teaching degree students must take modules worth a total of 15 ECTS credits in the area Freier Bereich (general as well as subject-specific electives) (Section 9 LASPO (general academic and examination regulations for teaching-degree programmes)).
To achieve the required number of ECTS credits, students may take any modules from the areas below.
Freier Bereich -- interdisciplinary: The interdisciplinary additional offer for a teaching degree can be found in the respective Annex "Ergänzende Bestimmungen für den "Freien Bereich" im Rahmen des Studiums für ein Lehramt".

Computer Science

(Freier Bereich (general as well as subject-specific electives) -- subject specific)

10-I-DS-092-m01	Seminar Didactics of Informatics	4	NUM	44
10-I-DV-092-m01	Advanced Topics of Didactic of Informatics	4	NUM	45
10-I-DP-092-m01	Practical Course in Didactics of Informatics	4	B/NB	41
10-I-DPP-092-m01	Advanced Practical Course in Didactics of Informatics	8	NUM	43

Thesis (10 ECTS credits)

Preparation of a written Hausarbeit (thesis) in accordance with the provisions of Section 29 LPO I (examination regulations for teaching-degree programmes) is a prerequisite for teaching degree students to be admitted to the Erste Staatsprüfung (First State Examination). In accordance with the provisions of Section 29 LPO I, students studying for a teaching degree Gymnasium may write this thesis in one of the subjects they selected as vertieft studiertes Fach (subject studied with a focus on the scientific discipline) or in the subject Erziehungswissenschaften (Educational Science). Pursuant to Section 29 Subsection 1 Sentence 2 LPO I, students may also choose to write an interdisciplinary thesis.

10-I-HA-GY-092-m01	Thesis Informatics (Gymnasium)	10	NUM	47

Module title			Abbreviation	
Computer Science in Media 1			06-MK-MedInf1-102-m01	

Module coordinator			Module offered by	
holder of the Professorship of Media Informatics			Institute of Human Computer Media	

ECTS	Method of grading		Only after succ. compl. of module(s)	
6	numerical grade		--	

Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	

Contents

Media computer science is an interdisciplinary field of teaching and research, dealing with various aspects of information processing in the context of digital media. The module *Medieninformatik 1* (*Computer Science for Media 1*) provides students with a fundamental knowledge and a practical overview of current digital media types.

Intended learning outcomes

Students are familiar with the central concepts of media informatics. They have a basic knowledge of information processing with a special focus on digital media.

Courses (type, number of weekly contact hours, language — if other than German)

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)

a) written examination (approx. 60 minutes) or b) written examination (approx. 40 minutes) with exercises (40 hours), weighted 5:1 or c) oral examination of one candidate each (approx. 30 minutes) or d) presentation (15 to 30 minutes) with written elaboration (10 to 15 pages) or e) term paper (15 to 20 pages) or f) portfolio (maximum 20 pages)
Language of assessment: German, English

Allocation of places

Digital Humanities Master's (120 ECTS): maximum 10 places. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Media Communication (2012)
Bachelor' degree (1 major) Media Communication (2010)
Master's degree (1 major) Digital Humanities (2011)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Computer Science in Media 2	06-MK-MedInf2-102-m01

Module coordinator	Module offered by
holder of the Professorship of Media Informatics	Institute of Human Computer Media

ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module *Medieninformatik 2* (*Computer Science for Media 2*) provides deeper knowledge of digital media types and the fundamentals of digital media development and design.

Intended learning outcomes

Students have gained a deeper insight into selected concepts of media computer science. In addition, they are able to develop digital media based on various processes. Thus, a basis is provided for academic work as well as for acquiring practically relevant media skills.

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 (approx. 60 minutes) or b) written examination (approx. 40 minutes) with exercises (40 hours), weighted 5:1 or c) oral examination of one candidate each (approx. 30 minutes) or d) presentation (15 to 30 minutes) with written elaboration (10 to 15 pages) or e) term paper (15 to 20 pages) or f) portfolio (maximum 20 pages)
Language of assessment: German, English

Allocation of places

Digital Humanities Master's (120 ECTS): maximum 10 places. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Media Communication (2012)
Bachelor' degree (1 major) Media Communication (2010)
Master's degree (1 major) Digital Humanities (2011)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Computational Geometry		10-I=AG-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

In many areas of computer science -- for example robotics, computer graphics, virtual reality and geographic information systems -- it is necessary to store, analyse, create or manipulate spatial data. This class is about the algorithmic aspects of these tasks: We will acquire techniques that are needed to plan and analyse geometric algorithms and data structures. Every technique will be illustrated with a problem in the practical areas listed above.

Intended learning outcomes

The students are able to decide which algorithms or data structures are suitable for the solution of a given geometric problem. The students are able to analyse new problems and to come up with their own efficient solutions based on the concepts and techniques acquired in the lecture.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Algorithms for Geographic Information Systems	10-I=AGIS-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Algorithmic foundations of geographic information systems and their application in selected problems of acquisition, processing, analysis and presentation of spatial information. Processes of discrete and continuous optimisation. Applications such as the creation of digital height models, working with GPS trajectories, tasks of spatial planning as well as cartographic generalisation.

Intended learning outcomes

The students are able to formalise algorithmic problems in the field of geographic information systems as well as to select and improve suitable approaches to solving these 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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Approximation Algorithms	10-I=APA-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

The task of finding the optimal solution for a given problem is omnipresent in computer science. Unfortunately, there are many problems without an efficient algorithm for an optimal solution. As a result, in practice, methods are used which do not always give the optimal solution but always give good solutions. This lecture will discuss drafting and analysing techniques for algorithms which have a proven approximation quality. With the help of practical optimisation problems, the lecture will introduce students to important drafting techniques such as greedy, local search, scaling as well as methods based on linear programming.

Intended learning outcomes

The students are able to analyse easy approximation methods in terms of their quality. They understand fundamental drafting techniques such as greedy, local search and scaling as well as methods based on linear programming and are able to apply these to new 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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Automata Theory	10-I=AUT-102-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	graduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Finite automata, regular languages, star-free languages, natural equivalence relations, predicate logic with words, language acceptance through monoids, syntactic monoid, predicate logical and algebraic characterisation of regular languages and star-free languages, two-way automata.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of finite automata, regular languages, star-free languages, natural equivalence relations, predicate logic with words, language acceptance through monoids, syntactic monoid, predicate logical and algebraic characterisation of regular and star-free languages, two-way automata.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Computability Theory	10-I=BER-102-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	graduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Gödel numbering, computable functions, decidable and countable sets, halting problem, m-reducibility, creative and productive sets, relative computability, Turing reduction, countable degrees, arithmetic hierarchy.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of Gödel numbers, countable functions, decidable and countable sets, halting problem, m-reducibility, creative and productive sets, relative computability, Turing reduction, countable degrees, arithmetic hierarchy.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Compiler Construction	10-I=CB-102-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)	
8	numerical grade	--	

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Lexical analysis, syntactic analysis, semantics, compiler generators, code generators, code optimisation.

Intended learning outcomes

The students possess knowledge in the formal description of programming languages and their compilation. They are able to perform transformations between them with the help of finite automata, push-down automata and compiler generators.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Databases II	10-I=DB2-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Data warehouses and data mining; XML databases; web databases; introduction to Datalog.

Intended learning outcomes

The students have advanced knowledge about relational databases, XML and data mining.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Business Information Systems (2011)
Master's degree (1 major) Business Information Systems (2013)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Deductive Databases	10-I=DDB-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Syntax and semantics of logic programs; data structures, program structures and applications for Prolog; analytical methods for Datalog; negation and stratification; disjunctive logic programs.

Intended learning outcomes

The students possess expertise in working with Prolog and Datalog (including negation and disjunction).

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Data Compression	10-I=DK-102-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)
8	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Entropy coding, text compression, dictionary methods, block transformations, image compression, human visual system, bitplane techniques, predicative methods, hierarchical transformations, discrete cosine transform, wavelets, JPEG baseline, JPEG 200, subband coding, fractal compression, vector quantisation, video compression, MPEG standards, audio compression.

Intended learning outcomes

The students possess the methodic knowledge and practical skills for the development and use of compression methods for text, image, video and audio data.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
E-Learning	10-I=EL-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Learning paradigms, learning system types, author systems, learning platforms, standards for learning systems, intelligent tutoring systems, student models, didactics, problem-oriented learning and case-based training systems, adaptive tutoring systems, computer-supported cooperative learning, evaluation of learning systems.

Intended learning outcomes

The students possess a theoretical and practical knowledge about eLearning and are able to assess possible applications.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Business Information Systems (2011)
Master's degree (1 major) Business Information Systems (2013)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Embedded Systems		10-I=ES-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Models of embedded systems, implementation methods (ASIC, AISIP, micro controller), verification of embedded systems, implementation planning static, periodic and dynamic, binding problems, hardware synthesis, software synthesis.

Intended learning outcomes

The students are familiar with the technical possibilities for the design of embedded systems and master the most important techniques for the modelling, verification and optimisation of such systems in hardware and software.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Information Retrieval	10-I=IR-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

IR models (e. g. Boolean and vector space model, evaluation), processing of text (tokenising, text properties), data structures (e. g. inverted index), query elements (e. g. query operations, relevance feedback, query languages and paradigms, structured queries), search engine (e. g. architecture, crawling, interfaces, link analysis), methods to support IR (e. g. recommendation systems, text clustering and classification, information extraction).

Intended learning outcomes

The students possess theoretical and practical knowledge in the area of information retrieval and have acquired the technical know-how to create a search engine.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Business Information Systems (2011)
Master's degree (1 major) Business Information Systems (2013)
Master's degree (1 major) Functional Materials (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Cryptography and Data Security	10-I=KD-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Private key cryptography systems, Vernam one-time pad, AES, perfect security, public key cryptography systems, RSA, Diffie-Hellman, Elgamal, Goldwasser-Micali, digital signature, challenge-response methods, secret sharing, millionaire problem, secure circuit evaluation, homomorphous encryption.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of private key cryptography systems, Vernam one-time pad, AES, perfect security, public key cryptography, RSA, Diffie-Hellman, Elgamal, Goldwasser-Micali, digital signature, challenge-response method, secret sharing, millionaire problem, secure circuit evaluation, homomorphous encryption

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Artificial Intelligence		10-I=KI-102-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)
8	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Intelligent agents, uninformed and heuristic search, constraint problem solving, search with partial information, propositional and predicate logic and inference, knowledge representation, planning, probabilistic closure and Bayesian networks, utility theory and decidability problems, learning from observations, knowledge while learning, neural networks and statistical learning methods, reinforcement learning.

Intended learning outcomes

The students possess theoretical and practical knowledge about artificial intelligence and are able to assess possibilities for its 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)

written examination (approx. 80 to 90 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Advanced Topics in Computational Complexity	10-I=KT2-122-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	graduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Properties of NP-complete sets, autoreducibility, interactive proof systems, polynomial time hierarchy, complexity of probabilistic algorithms.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of properties of NP-complete sets, autoreducibility, interactive proof systems, polynomial time hierarchies, 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Analytical Performance Evaluation of Distributed Systems		10-I=LVS-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Traffic theoretic models, fundamental concepts of theory of probability, transformation techniques, stochastic processes, methods for performance analysis of technical systems, queue-/traffic theory, analysis of Markov, non-Markov and time critical systems, matrix analytical method, practical examples for performance analysis of computer systems and networks: throughput and goodput analysis and other characteristics.

Intended learning outcomes

The students possess the methodic knowledge and the practical skills necessary to model technical systems by means of the theory of probability and mathematical statistics.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Mathematical Logic	10-I=ML-102-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	graduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents
Propositional logic, first-order predicate logic, proof and deduction, Gödel's completeness theorem, Tarski theorem, Gödel's incompleteness theorem, undecidability and nonaxiomatisability of elemental arithmetic.

Intended learning outcomes
The students possess a fundamental and applicable knowledge in the areas of propositional logic, first-order predicate logic, proof and deduction, Gödel's completeness theorem, Tarski theorem, Gödel's incompleteness theorem, undecidability and nonaxiomatisability of elemental arithmetic.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Program Design and Analysis	10-I=PA-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Program analysis, model creation in software engineering, program quality, test of programs, process models.

Intended learning outcomes

The students are able to analyse programs, to use testing frameworks and metrics as well as to judge program quality.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Business Information Systems (2011)
Master's degree (1 major) Business Information Systems (2013)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Programming of Distributed Systems	10-I=PVS-102-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)
8	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Design and development of parallely and distributedly executed programs.

Intended learning outcomes

The students possess the methodic knowledge and practical skills for the design and development of parallely and distributedly running programs.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Computer Arithmetic	10-I=RAM-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Spaces of numerical computation, raster and rounding, definition and implementation of computational arithmetic and interval calculation.

Intended learning outcomes

The students possess knowledge about the spaces of numerical computation, raster and roundings, definition and implementation of computational arithmetic and interval calculation. They master the application of 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title			Abbreviation
Robotics			10-I=RO-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

History, applications and properties of robots, direct kinematics of manipulators: coordinate systems, rotations, homogenous coordinates, axis coordinates, arm equation. Inverse kinematics: solution properties, end effector configuration, numerical and analytical approaches, examples of different robots for analytical approaches. Workspace analysis and trajectory planning, dynamics of manipulators: Lagrange-Euler model, direct and inverse dynamics. Mobile robots: direct and inverse kinematics, propulsion system, tricycle, Ackermann steering, holonomes and non-holonome restrictions, kinematic classification of mobile robots, posture kinematic model. Movement control and path planning: roadmap methods, cell decomposition methods, potential field methods. Sensors: position sensors, speed sensors, distance sensors.

Intended learning outcomes

The students master the fundamentals of robot manipulators and vehicles and are, in particular, familiar with their kinematics and dynamics as well as the planning of paths and task execution.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Robotics II: Networked Robots	10-I=RO2-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Foundations of dynamic systems, controllability and observability, controller design through pole assignment: feedback and feed-forward, state observer, feedback with state observer, time discrete systems, stochastic systems: foundations of stochastics, random processes, stochastic dynamic systems, Kalman filter: derivation, initialising, application examples, problems of Kalman filters, extended Kalman filter.

Intended learning outcomes

The students master all fundamentals that are necessary to understand Kalman filters and their use in applications of robotics. The students possess a knowledge of advanced controller and observer methods and recognise the connections between the dual pairs controllability - observability as well as controller design and observer design. They also recognise the relationship between the Kalman filter as a state estimator and an observer.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Simulation Techniques for Performance Evaluation	10-I=ST-102-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	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Introduction to simulation techniques, statistical groundwork, creation of random numbers and random variables, random sample theory and estimation techniques, statistical analysis of simulation values, inspection of measured data, planning and evaluation of simulation experiments, special random processes, possibilities and limits of model creation and simulation, advanced concepts and techniques, practical execution of simulation projects.

Intended learning outcomes

The students possess the methodic knowledge and the practical skills necessary for the stochastic simulation of (technical) systems, the evaluation of results and the correct assessment of the possibilities and limits of simulation methods.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Natural Language Processing and Text Mining	10-I=STM-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

Foundations in the following areas: definition of NLP and text mining, properties of text, sentence boundary detection, tokenisation, collocation, N-gram models, morphology, hidden Markov models for tagging, probabilistic parsing, word sense disambiguation, term extraction methods, information extraction, sentiment analysis. The students possess theoretical and practical knowledge about typical methods and algorithms in the area of text mining and language processing mostly for English. They are able to solve problems through the methods taught. They have gained experience in the application of text mining algorithms.

Intended learning outcomes

The students possess theoretical and practical knowledge about typical methods and algorithms in the area of text mining and language processing. They are able to solve practical problems with the methods acquired in class. They have gained experience in the application of text mining 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Visualization of Graphs		10-I=VG-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	graduate	Where applicable, prerequisites as specified by the lecturer at the beginning of the course (e. g. completion of exercises).

Contents

This course covers the most important algorithms to draw graphs. Methods from the course *Algorithmische Graphentheorie* (*Algorithmic Graph Theory*) such as divide and conquer, flow networks, integer programming and the planar separator theorem will be used. We will become familiar with measures of quality of a graph drawing as well as algorithms to optimise these measures.

Intended learning outcomes

The participants get an overview of graph visualisation and become familiar with typical tools. They consolidate their knowledge about the modelling and solving of problems with the help of graphs and 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Algorithm and data structures		10-I-ADS-102-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	numerical grade	--	

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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

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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. a) Informatik Theoretische Informatik, Algorithmen und Datenstrukturen
§ 69 (1) 1. a) Informatik Theoretische Informatik, Algorithmen und Datenstrukturen

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Master's degree (1 major) Digital Humanities (2011)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Automation and Control Technology	10-I-AR-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Overview of 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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)

Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Databases	10-I-DB-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Relational algebra and complex SQL statements; database planning and normal forms; transaction management.

Intended learning outcomes

The students possess knowledge about database modelling and queries in SQL as well as transactions.

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. 50 to 60 minutes)
if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. b) Datenbanksysteme und Softwaretechnologie
§ 69 (1) 1. b) Datenbanksysteme und Softwaretechnologie

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Bachelor' degree (1 major) Functional Materials (2012)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)

Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Didactics of Informatics 1		10-I-DDI1-092-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)
4	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

The module gives an overview of computer science didactics. It demonstrates and discusses possibilities for a practical application in the classroom.

Intended learning outcomes

Students are familiar (in particular in the area of computer science in *Sekundarstufe I*) with methods, techniques and media for teaching topics in computer science. They are able to didactically analyse and prepare practical topics. Students are familiar with both historical and current teaching approaches, typical teaching methods as well as guidelines and standards for teaching computer science. They are able to plan, organise and deliver classes.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 2. Informatik Didaktik

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module title	Abbreviation
Didactics of Informatics 2	10-I-DDI2-092-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)
4	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

This course discusses different topics in computer science didactics in more detail. It demonstrates and discusses possibilities for a practical application in the classroom.

Intended learning outcomes

The students are able to plan, execute and assess projects, are familiar with important aspects of the planning and analysis of computer science classes, master fundamental teaching and learning strategies and are able to assess these.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 2. Informatik Didaktik

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Data Mining	10-I-DM-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Foundations in the following areas: definition of data mining and knowledge, discovery in databases, process model, relationship to data warehouse and OLAP, data preprocessing, data visualisation, unsupervised learning methods (cluster and association methods), supervised learning (e. g. Bayes classification, KNN, decision trees, SVM), learning methods for special data types, other learning paradigms.

Intended learning outcomes

The students possess a theoretical and practical knowledge of typical methods and algorithms in the area of data mining and machine learning. They are able to solve practical knowledge discovery problems with the help of the knowledge acquired in this course and by using the KDD process. They have acquired experience in the use or implementation of data mining 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Practical Course in Didactics of Informatics	10-I-DP-092-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)
4	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This course covers practical topics in teaching computer science such as "functional programming in the classroom" or "robotics in the classroom". In particular, the course discusses subject-specific foundations, didactic analyses, the contemporary debate in computer science didactics as well as possible approaches in the classroom.

Intended learning outcomes

The students possess practical skills in working with the selected computer science systems discussed in the course and are able to use these in the classroom, taking into account subject didactic as well as methodical aspects.

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, presentation (type and expenditure of time to be specified by the lecturer at the beginning of the course)
Assessment offered: usually only in the semester in which the course is offered

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Practical Course in the Application of Informatics Systems from a Didactical Point of View		10-I-DPAI-092-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	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Using the example of computer science systems, the module teaches students practical skills for use in schools and, more specifically, in computer science classes. The module demonstrates and discusses possibilities for a practical application in the classroom.

Intended learning outcomes

The students possess practical skills in working with selected computer science systems and are able to apply these skills in the classroom.

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, presentation (type and expenditure of time to be specified by the lecturer at the beginning of the course)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 2. Informatik Didaktik

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Advanced Practical Course in Didactics of Informatics		10-I-DPP-092-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
2 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

Design and implementation of a school project on a topic in computer science, e. g. for project days, school term papers (*Facharbeiten*), *Pluskurse* (additional courses for the in-depth study of areas of special interest), workshops. In the theoretical phase, the students formulate the subject-specific and didactic requirements of the topic, search for a suitable topic, elaborate this topic for the project and draw up a project plan. This is done in groups with students providing each other with advice as well as challenging and reflecting on each other's work. In the practical phase, the students prepare the implementation of the project, implement the project with pupils and afterwards reflect the planning and implementation.

Intended learning outcomes

The students are able to select a topic from the area of computer science that is suitable for a school project and are able to elaborate it. They are familiar with different aspects of project planning and management and are able to critically reflect the process.

Courses (type, number of weekly contact hours, language — if other than German)

P + 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)

project and implementation thereof: drawing up a project plan (approx. 10 pages) and practical implementation with pupils
Assessment offered: usually only in the semester in which the course is offered

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Seminar Didactics of Informatics	10-I-DS-092-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)
4	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Selected topics in computer science didactics.

Intended learning outcomes

The students gain initial experience in the area of independent scientific work. They are able to acquaint themselves with and structure a given topic, using selected literature, as well as to prepare a talk on the respective subject. They are also able to actively participate in a scientific discussion.

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 (approx. 20 to 25 pages) and oral presentation (approx. 60 minutes) with subsequent discussion (approx. 15 minutes) on a topic from the field of computer science didactics
Assessment offered: usually only in the semester in which the course is offered

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Advanced Topics of Didactic of Informatics	10-I-DV-092-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)
4	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Discussion of topics in teaching computer science in *Gymnasium* that takes into account different aspects, in particular subject-specific foundations, didactic analyses, the contemporary debate in computer science didactics as well as possible approaches in the classroom.

Intended learning outcomes

The students are able to discuss central topics and issues on teaching computer science in a *Gymnasium*, taking into account subject-specific, didactic and methodical aspects.

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 (approx. 20 to 25 pages) and oral presentation (approx. 60 minutes) with subsequent discussion (approx. 15 minutes) on a topic from the field of computer science didactics
Assessment offered: usually only in the semester in which the course is offered

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Algorithmic Graph Theory	10-I-GT-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

Contents

We discuss 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. Using the examples of graph problems, we also become familiar with new concepts, for example how we model problems as linear programs or how we show that they are fixed parameter computable.

Intended learning outcomes

The students are able to model typical problems in computer science as graph problems. In addition, the participants are able to decide which tool from the course 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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2010)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Thesis Informatics (Gymnasium)	10-I-HA-GY-092-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	numerical grade	Where applicable, specific modules/module components as specified by supervisor.

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Largely independently researching and writing on a scientific topic in computer science or computer science didactics.

Intended learning outcomes

The students are able to largely independently research and write on a scientific topic in computer science or computer science didactics, using known methods.

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 (approx. 250 to 300 hours total)
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

Additional information on module duration: 1 to 2 semesters.

Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Practical Course in Hardware		10-I-HWP-102-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, presentation (type and expenditure of time to be specified by the lecturer at the beginning of the course)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
First state examination for the teaching degree Gymnasium Computer Science (2009)
No final examination Special study offering (2010)

Module title		Abbreviation
Information Transmission		10-I-IÜ-102-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)	
10	numerical grade	--	

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 1. c) Informatik Technische Informatik

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Theory of Complexity	10-I-KT-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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

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.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)

Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Logic for informatics		10-I-LOG-102-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)
6	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Object-Oriented Programming	10-I-OOP-GY-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 1. b) Datenbanksysteme und Softwaretechnologie

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Practical Course in Programming	10-I-PP-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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)

written examination (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

Additional information on module duration: 1 to 2 semesters.

Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. c) Informatik Praktische Softwareentwicklung
§ 69 (1) 1. d) Informatik Praktische Softwareentwicklung

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Digital Humanities (2011)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Digital computer systems	10-I-RAL-102-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	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 1. c) Informatik Technische Informatik

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Review Course in Informatics for the Staatsexamen (Gymnasium)		10-I-REP-GY-092-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)
4	(not) successfully completed	--

Duration	Module level	Other prerequisites
2 semester	undergraduate	--

Contents

Revision of contents of modules covering the subject as well as the subject didactics of computer science.

Intended learning outcomes

The students have refreshed their skills for the solution of the type of problems asked in the written state examination.

Courses (type, number of weekly contact hours, language — if other than German)

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)

completion of project assignments, presentation (type and expenditure of time to be specified by the lecturer at the beginning of the course)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Computer Networks and Communication Systems	10-I-RK-102-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	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.
Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)

Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Seminar 2	10-I-SEM2-072-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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Business Information Systems (2007)
Bachelor' degree (1 major) Business Information Systems (2009)
Bachelor' degree (1 major) Business Information Systems (2008)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title			Abbreviation	
Software Technology			10-I-ST-102-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	numerical grade		--	

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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.

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. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. b) Datenbanksysteme und Softwaretechnologie
§ 69 (1) 1. b) Datenbanksysteme und Softwaretechnologie

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Human-Computer Systems (2010)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)

First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Practical course in software	10-I-SWP-102-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)

completion of project assignments, presentation

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. c) Informatik Praktische Softwareentwicklung
§ 69 (1) 1. d) Informatik Praktische Softwareentwicklung

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Technical Informatics 1		10-I-TEI1-102-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	TGL: §69 I Nr. 1 c). Admission prerequisite to assessment: exercises; type and scope to be announced by the lecturer at the beginning of the course.

Contents

This course teaches the foundations of technical computer science.

Intended learning outcomes

The students master the fundamentals of technical computer science.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 1. c) Informatik Technische Informatik

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Technical Informatics 2	10-I-TEI2-102-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	TGL: §69 I Nr. 1 c). Admission prerequisite to assessment: exercises; type and scope to be announced by the lecturer at the beginning of the course.

Contents

This course teaches the foundations of technical computer science.

Intended learning outcomes

The students master the fundamentals of technical computer science.

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. 50 to 60 minutes); if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 69 (1) 1. c) Informatik Technische Informatik

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title		Abbreviation
Theoretical informatics		10-I-TI-102-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	numerical grade	--	

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: exercises (type and scope to be announced by the lecturer at the beginning of the course).

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 (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.

Allocation of places

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Additional information

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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 49 (1) 1. a) Informatik Theoretische Informatik, Algorithmen und Datenstrukturen
§ 69 (1) 1. a) Informatik Theoretische Informatik, Algorithmen und Datenstrukturen

Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title	Abbreviation
Knowledge-based Systems	10-I-WBS-102-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Foundations in the following areas: knowledge management systems, knowledge representation, solving methods, knowledge acquisition, learning, guidance dialogue, semantic web.

Intended learning outcomes

The students possess theoretical and practical knowledge for the understanding and design of knowledge-based systems including knowledge formalisation and have acquired experience in a small project.

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. 50 to 60 minutes)
if announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups (one candidate each: 15 minutes, groups of 2: 20 minutes, groups of 3: 25 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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Workload

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Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Business Information Systems (2013)
Bachelor' degree (1 major) Aerospace Computer Science (2009)
Bachelor' degree (1 major) Aerospace Computer Science (2011)
Master's degree (1 major) Computer Science (2010)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)
First state examination for the teaching degree Gymnasium Computer Science (2009)