

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"

> Examination regulations version: 2025 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Computer Science

Abbreviations used

UNIVERSITÄT

WÜRZBURG

Course types: \mathbf{E} = field trip, \mathbf{K} = colloquium, \mathbf{O} = conversatorium, \mathbf{P} = placement/lab course, \mathbf{R} = project, \mathbf{S} = seminar, \mathbf{T} = tutorial, $\ddot{\mathbf{U}}$ = exercise, \mathbf{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:

LASPO2015

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

??-???-2025 (2025-???)

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.

LA Gymnasien Co	mputer Science (202	5)
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The subject is divided into

Abbroviation		Madula titla	ECTS	Method	of	n 200
		Module lille	credits	gradin	g P	page
Scientific Discipline (92 E	CTS credits					
Compulsory Courses (60	ECTS cred	its)				
10-l-GdP-172-m01	Fundament	als of Programming	5	NUM		117
10-l-DB-152-m01	Databases		5	NUM		107
10-l-SE-252-m01	Software E	ngineering	5	NUM		150
10-l-ADS-152-m01	Algorithms	and data structures	10	NUM		96
10-l-PP-191-m01	Practical Co	ourse in Programming	10	B/NB		139
10-l-SWP-252-m01	Practical co	ourse in software	10	B/NB		155
10-l-Tl-242-m01	Theory of C	omputation	10	NUM		156
10-l-Kl-252-m01	Artificial In	telligence	5	NUM		127
Compulsory Electives (3	2 ECTS cred	lits)				
Technical Computer So	ience (10 E	CTS credits)				
10-I-BS-242-m01	Operating S	Systems	5	NUM		104
10-I-RAK-152-m01	Computer A	Architecture	5	NUM		141
10-I-RAL-252-m01	Digital com	puter systems	10	NUM		143
10-I-RIÜ-191-m01	Computer I	Networks and Information Transmission	10	NUM		146
General Compulsory Electives (22 ECTS credits)						
10-I-RAK-152-m01	Computer A	Architecture	5	NUM		141
10-I-RAL-252-m01	Digital com	puter systems	10 NUM			143
10-I-RIÜ-191-m01	Computer I	uter Networks and Information Transmission 10 NI		NUM		146
10-l-BS-242-m01	Operating S	ating Systems 5		NUM		104
10-I-HWP-152-m01	Practical co	cal course in hardware		B/NB		120
10-l-LOG-152-m01	Logic for in	formatics	5	NUM		131
10-I-AGT-152-m01	Algorithmic	: Graph Theory	5	NUM		98
10-l-lCG-152-m01	Interactive	Computer Graphics	5	NUM		122
10-I-APR-172-m01	Advanced I	Programming	5	NUM		100
10-I-KT-191-m01	Computatio	onal Complexity	5	NUM	-	128
10-I-KD-191-m01	Cryptograp	hy and Data Security	5	NUM		125
10-I-MSE-252-m01	Model-bas	ed Systems Engineering	5	NUM		135
10-l-3D-152-m01	3D Point Cl	oud Processing	5	NUM		94
10-LURI=PHO-	Dhotogram	matria Machina Visian	_	NULINA		.(
TO-232-m01	Photogram		5	NUM		162
10-I-RK-212-m01	Control Prir	nciples of Modern Communication Systems	5	NUM		148
10-I-SEM1-152-m01	Seminar - S	Selected Topics in Computer Science 1	5	NUM		151
10-I-PV-252-m01	Project Pre	sentation	2	NUM		140
10-LU-	Autonomou	utonomous Mobile Systems		NILIMA		160
RI=AMS-232-m01	Autonomot		10	NOM		100
10-I=EA-252-m01	Exact Algor	xact Algorithms 5 NU/		NUM		46
10-l=AG-232-m01	Computatio	onal Geometry	5	NUM		17
10-I=APA-161-m01	Approxima	tion Algorithms	5	NUM		35
10-I=AUT-212-m01	Automata 1	heory	5	NUM		37
10-I-AR-152-m01	Automatior	n and Control Technology	8	NUM		102
IA Cumpacian Computer Crience (1 474
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10-I-LFS-172-m01	Introductio	n to Aviation Systems	5	NUM	130
10-I-RFS-172-m01	Introductio	n to Space Systems	5	NUM	145
10-LURI-HWZ-252-				NULLAA	
m01	Hardware-C	oriented programming and Fundamentals Avionics	10	NUM	169
10-I=TSD-232-m01	Telecommu	unication Systems	10	NUM	88
10-I=RRS-232-m01	Remote Se	nsing	5	NUM	77
10-I-MuS-212-m01	Modeling a	nd Simulation	5	NUM	136
10-LU-	Catallita Im			NILINA	
RI=SBV-232-m01	Satellite In	lage processing	10	NUM	167
10-l=QC-261-m01	Quantum C	Communications	5	NUM	74
10-I=DRLISS-252-m01	Deep Reinf	orcement Learning for Intelligent Space Systems	5	NUM	44
10-I=BER-212-m01	Computabi	lity Theory	5	NUM	39
10-I=DB2-242-m01	Databases	2	5	NUM	41
10-I=DDB-212-m01	Deductive l	Databases	5	NUM	42
10-I=LP-212-m01	Logic Progr	amming	5	NUM	53
10-I=ES-231-m01	Embedded	Systems	5	NUM	48
10-I=VPES-232-m01	Virtual Prot	totyping of Embedded Systems	5	NUM	92
10-l=SB-252-m01	Systems Be	enchmarking	5	NUM	80
10-I-TML-222-m01	Theory of N	Aachine Learning	5	NUM	157
10-I-DL-222-m01	Deep Learn	ning	5	NUM	111
10-I-NLP-222-m01	Natural Lar	nguage Processing	5	NUM	137
10-I-CV-222-m01	Computer \	/ision	5	NUM	105
10-I=NLP-212-m01	Machine Le	earning for Natural Language Processing	5	NUM	69
10-I=STM-162-m01	NLP and Te	xt Mining	5	NUM	86
10-I=MNLP-232-m01	Multilingua	al NLP	5	NUM	66
10-I=NAMO-232-m01	Sustainabl	e Mobility	5	NUM	68
10-l-luE-212-m01	Computer S	Science and Ethics	5	NUM	124
10-AI=ML-242-m01	Machine Le	earning	5	NUM	8
10-I=MLN1-232-m01	Machine Le	earning for Networks 1	5	NUM	62
10-I=MLN2-232-m01	Machine Le	earning for Networks 2	5	NUM	64
10-I-SNA-222-m01	Statistical I	Network Analysis	5	NUM	153
10-I=IP-222-m01	Image Proc	essing and Computational Photography	5	NUM	49
10-I=RLCDM-252-m01	Reinforcem	nent Learning and Computational Decision Making	5	NUM	76
10-I=MIR-252-m01	Music Infor	rmation Retrieval	5	NUM	59
10-l=0R-232-m01	Operations	Research	5	NUM	71
10-I=IR-242-m01	Informatior	n Retrieval	5	NUM	51
10-I=KT2-212-m01	Computatio	onal Complexity II	5	NUM	52
10-I=LVS-232-m01	Performanc	ce Evaluation of Distributed Systems	5	NUM	55
10-Al=IAI-242-m01	Introductio	n in Al	5	NUM	7
10-I=ML-212-m01	Mathemati	cal Logic	5	NUM	60
10-l=Ml-212-m01	Medical Inf	formatics	5	NUM	57
10-I=PM-252-m01	Profession	al Project Management	5	NUM	73
10-LU-		-	-	,	
RI=R01-232-m01	Robotics 1		5	NUM	163
10-LU- RI=RO2-232-mo1	Robotics 2		10	NUM	165
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10-I=ST-232-m01	Discrete Event Simulation	5	NUM	84
10-l=El1-232-m01	Energy Informatics 1	5	NUM	47
10-I=SAR-161-m01	Software Architecture	5	NUM	78
10-LURI=S- SA-232-m01	Spacecraft System Analysis	10	NUM	168
10-I=VG-161-m01	Visualization of Graphs	5	NUM	90
10-I=SEC-252-m01	Introduction to IT Security	5	NUM	81
10-I=SSS-232-m01	Security of Software Systems	5	NUM	82
10-I=AKA-232-m01	Selected Topics in Algorithms	5	NUM	20
10-I=AKT-232-m01	Selected Topics in Theory	5	NUM	34
10-I=AKSE-232-m01	Selected Topics in Software Engineering	5	NUM	33
10-I=AGE-232-m01	Selected Topics in Games Engineering	5	NUM	19
10-I=AKITS-232-m01	Selected Topics in IT Security	5	NUM	29
10-I=AKIT-232-m01	Selected Topics in Internet Technologies	5	NUM	27
10-I=AKIS-232-m01	Selected Topics in Intelligent Systems	5	NUM	26
10-I=AKES-232-m01	Selected Topics in Embedded Systems	5	NUM	23
10-I=AKLR-232-m01	Selected Topics in Aerospace Engineering	5	NUM	30
10-I=AKHCI-232-m01	Selected Topics in HCI	5	NUM	24
10-I=AKDS-232-m01	Selected Topics in Data Science	5	NUM	22
10-I=A- KAMS-232-m01	Selected Topics in Autonomous Mobile Systems	5	NUM	21
10-I=AKNA-232-m01	Selected Topics in Computer Science and Sustainability	5	NUM	32
10-I=AKII-232-m01	Selected Topics in Computer Science	5	NUM	25
10-HCI=M- MUI-161-m01	Multimodal User Interfaces	5	NUM	13
10-I-MCS-242-m01	Introduction into Human-Computer Interaction	5	NUM	133
10-HCI=3DUI-161- mo1	3D User Interfaces	5	NUM	9
10-HCl=M- LUI-161-m01	Machine Learning (for User Interfaces)	5	NUM	11
10-HCI=RIS-182-m01	Real-Time Interactive Systems	5	NUM	15
10-MK-Dig- Med1-212-m01	Digital media 1	5	NUM	170
10-MK-Dig- Med2-212-m01	Digital media 2	10	NUM	171
Teaching (10 ECTS credits	s)			
Compulsory Courses (10	ECTS credits)			
10-I-DDI1-152-m01	Computer Science Education 1 (incl. Practical Course in the Ap- plication of Computer Science Systems form an Educational Point of View)	6	NUM	109
10-I-DDI2-GY-152-m01	Computer Science Education 2	4	NUM	110
Intership in school (4 ECTS ci	redits)			
Students studying for a teach gy (studienbegleitendes fach Fach (subject studied with a f	ing degree Gymnasium must complete a practical training in did didaktisches Praktikum) which refers to one of the subjects they focus on the scientific discipline) pursuant to Section 34 Subsec	actics and selected tion 1 No.	l teaching meth as vertieft studi 4 LPO I (examin	odolo- ertes ation

Fách (subject studied with a focus on the scientific discipline) pursuant to Section 34 Subsection 1 No. 4 LPO I (examination regulations for teaching-degree programmes). The obligatory accompanying tutorial is offered by the respective subject. The ECTS credits obtained are counted in the subject Erziehungswissenschaften pursuant to Section 10 Subsection 3 LASPO (general academic and examination regulations for teaching-degree programmes).

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10-L-SBED-GV-152-mo1	Practical Training in Classroom Teaching in Computer Science	4	B/NB	140	
10-1-36FD-01-152-1101	Education including Theory (German Gymnasium)	4	D/ND	149	
Freier Bereich (general as we	ll as subject-specific electives)				
Teaching degree students mu ject-specific electives) (Section To achieve the required numb Freier Bereich interdisciplin nex "Ergänzende Bestimmung	st take modules worth a total of 15 ECTS credits in the area Freie on 9 LASPO (general academic and examination regulations for t per of ECTS credits, students may take any modules from the are ary: The interdisciplinary additional offer for a teaching degree of gen für den "Freien Bereich" im Rahmen des Studiums für ein Le	er Bereich (eaching-de as below. can be four hramt".	general as well egree programm nd in the respec	as sub- nes)). ctive An-	
Computer Science					
(Freier Bereich (general as w	ell as subject-specific electives) subject specific)	r	1		
10-I-REP-152-m01	Exam Tutorial for the German Staatsexamen	4	B/NB	144	
10-l-DS-152-m01	Seminar Computer Science Education	4	NUM	115	
10-I-DV-152-m01	Advanced Topics of Computer Science Education	4	B/NB	116	
10-l-DRO-152-m01	Robotics in Education (practical course)	4	B/NB	114	
10-l-DPR-152-m01	Practical Course on Computer Science Education	4	B/NB	113	
10-I-DPP-152-m01	Hands-on Computer Science	6	B/NB	112	
10-I-TUT1-152-m01	Tutor activity 1	2	B/NB	158	
10-I-TUT2-152-m01	Tutor activity 2	2	B/NB	159	
Hausarbeit (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 Gymnasi-um 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-152-m01 Thesis Computer Science (Teaching Degree at the German					
_	Gymnasium)			_	

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Module	title				Abbreviation
Introdu	ction i	n Al			10-AI=IAI-242-m01
Module coordinator Module offered			Module offered by	·	
Dean of Studies Informatik (Computer Science)			Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Essenti ging fro	al cono m clas	cepts and algorithms of a sical simple heuristic me	rtificial intelligence. T thods to more compl	Theoretical or praction ex probabilistic mod	cal competences are taught, ran- dels of artificial intelligence.
Intende	ed lear	ning outcomes			
The stu tify and	dents l apply	have theoretical and prac appropriate methods to s	tical knowledge in th	e field of artificial in field of AI.	telligence. They are able to iden-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	ın)
V (2) + Module	Ü (2) e taugh	t in: German and/or Engli	ish		
Methoo ster, inf	l of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
If annou examin prox. 19 Langua credital	unced ation c minut ge of a ble for	by the lecturer at the beg of one candidate each (ap es per candidate). ssessment: German and/ bonus	onning of the course, oprox. 20 minutes) or for English	the written examina an oral examination	tion may be replaced by an oral a in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ıg cycl	e			
Teachir	Teaching cycle: every year, winter semester				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
§ 22	Vr. 3 b)				
Module	e appea	ars in			
Master	s degr	ee (1 major) Artificial Inte	lligence (2024)		
Master	s degr	ee (1 major) Mathematica	ll Data Science (2025)	
Master	s degr	ee (1 major) Aerospace Co	omputer Science (202	25) Computer Colores (
FIRST STA	ite exa	mination for the teaching	, degree Gymnasium	Computer Science (2	2025)

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Module	title				Abbreviation	
Machine Learning				10-Al=ML-242-m01		
Module	coord	inator		Module offered by		
Dean of Studies Informatik (Computer Science)		Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Founda dels, ap ning. Si	tions in oproacl upervis	n the following areas: The nes and algorithms, and t ed and unsupervised lea	eoretical knowledge a their practical implen rning methods.	and practical experie nentation for the clas	nce in machine learning. Mo- ssical problems of machine lear-	
Intende	ed learn	ning outcomes				
The stu machin propria	dents I e learn te metl	nave theoretical and prac ing. They are able to solv nods. They have experien	tical knowledge of ty e practical problems ce in the application	pical models, metho in the field of machi or implementation o	ds and algorithms in the field of ine learning with the help of ap- of machine learning approaches.	
Course	s (type	number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) + Module	Ü (2) e taugh	t in: German and/or Engli	ish			
Method ster, inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
Written If annou examin prox. 15 Langua credital	examin unced l ation o minut ge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg f one candidate each (ap es per candidate). ssessment: German and/ bonus	o minutes) inning of the course, prox. 20 minutes) or ′or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir	ng cycl	9				
Teachir	ng cycle	e: every year, winter seme	ester			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
§ 22	Vr. 3 b)					
Module	e appea	rs in				
Master' Master' First sta	s degre s degre ate exa	ee (1 major) Artificial Inte ee (1 major) Mathematica mination for the teaching	lligence (2024) I Data Science (2025 degree Gymnasium) Computer Science (2	2025)	

Module	title				Abbreviation	
3D User Interfaces 10-HCI=3DUI-161-mo1					01	
Module	coord	nator		Module offered by	-	
holder c	of the C	hair of Computer Scie	nce IX	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Content	s					
This mo lopment to learn ques. Do on, the tegratin practica deo. Pre betweer and http Intende Spatial i spatial i	dule w t using and p esign g course g 3DUI Il proje evious n each os://w d learr e cours interfa	ill give students the op Virtual, Augmented or ractice the skills essen guidelines as well as cl will address novel res s with mobile devices, ct (team work), which years, the assignment other to find the best ww.youtube.com/watc hing outcomes se, the students will ga ces. They will have a bi ces, as well as evaluat	portunity to learn abor Mixed Reality technolo tial to the design and i assical and innovative earch themes such as robotics, and the envir will consist of a progra replicated the IEEE 3DI solution (see results at h?v=gYs-pBW7Agc) in a solid background oad understanding of ng then. Students will	ut the specificities of ogies. The module co mplementation of hi 3D Interaction techn 3D interaction for lar ronment. Students w m, a presentation, a JI Contest 2011, whe https://www.youtub on the theory and the the particular difficu also learn about trac	3D User Interfaces (ontent will be mainly gh-quality 3D interac- iques will be studied ge displays and gam ill be assessed throu- technical report (2 a re teams of students be.com/watch?v=gYs e methods to create lities of designing an ditional and novel 3D	3DUI) deve- dedicated ction techni- d. In additi- les; and in- ugh a group ges) and a vi- s competed 5-pBW7Agc your own 3D d developing) input/out-
put devi	ices (e	.g, motion tracking sys	tem and Head-mounte	d Display).		, mput/out-
Courses	s (type,	number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) + Ü	Ĵ (2)					
Method ster, inf	of ass ormati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
presenta Languag creditab	ation c ge of a ple for	f project results (appro ssessment: German ar bonus	ox. 30 minutes) d/or English			
Allocati	on of p	laces				
Addition	nal info	ormation				
Focuses HCI,GE.	s availa	ble for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits):
Workloa	ad					
150 h						
Teachin	g cycl	9				
	<u> </u>					
Referred	d to in	LPOI (examination re-		degree programmes)		
8 22 II N	$\frac{1}{1}$					
Module	annea	rs in				
Master	s degra	e (1 maior) Computer	Science (2016)			
Master's	s degre	ee (1 major) Mathemati	cs (2016)			
Master's	Master's degree (1 major) Computational Mathematics (2016)					
Master's	s degre	ee (1 major) Computer	Science (2017)			
Master's	s degre	ee (1 major) Computer	Science (2018)			
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Master's degree (1 major) Computational Mathematics (2019)

Master's degree (1 major) Mathematics (2019)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Computer Science (2021)

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Computer Science (2023)

Master's degree (1 major) Computational Mathematics (2024)

Master's degree (1 major) Mathematics (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Computer Science (2025)

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Module	e title				Abbreviation
Machir	ne Lear	ning (for User Interfaces)			10-HCI=MLUI-161-m01
Module	e coord	inator		Module offered by	·
holder	ofthe	Chair of Computer Scienc	e IX	Institute of Comput	er Science
ECTS	Meth	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
Machir cade, r vastly i ly use i all area gesture wards In this plemer but als Finally, and AI. This co Topics nels, n deep le learnin how to standin dio, da	ne learr machin improve it dozer as where as where as where as where as where as where burse human course human human course human humh	ning is the science of gett e learning has given us p ed understanding of the h has of times a day without re the understanding of u ch, or eye-gaze, is param -level AI. , students will learn about rem and getting them to v the practical know-how n earn about some of Silico rovides a broad introduct e: (i) Supervised learning etworks). (ii) Unsupervise). (iii) Best practices in m AI). The course will also d learning algorithms to bu o search, anti-spam), sma mining, and other areas.	ing computers to act ractical speech recognuman genome. Mach knowing it. It is one of ser input of high varia ount. Many researche the most effective ne vork. Students not on eeded to quickly and n Valley's best practi ion to machine learning (parametric/non-par ed learning (clustering achine learning (bias raw from numerous of ilding gesture-based art robots (perception	without being explic nition, effective web nine learning is so po of today's prominent ability, specifically for ers also think it is the nachine learning tec ly learn the theoretic powerfully apply the ces in innovation as ing, data-mining, and ametric algorithms, g, dimensionality rec s/variance theory; in ase studies and app and multimodal inter , control), computer	itily programmed. In the past de- o search, self-driving cars, and a ervasive today that you probab- paradigms in HCI applicable in or natural interactions using, e.g., e best way to make progress to- hniques, and gain practice im- cal underpinnings of learning, ese techniques to new problems. it pertains to machine learning d statistical pattern recognition. support vector machines, ker- duction, recommender systems, novation process in machine olications, so that you'll also learn erfaces, text and speech under- vision, medical informatics, au-
Intend	ed lear	ning outcomes			
After th gies, e Studer rious a	ne cour .g., like nts will pplicat	se, the students will be a Octave. In addition, they be able to choose the ap ion area, specifically in H	ble to solve machine will be able to derive propriate approach a ICI.	learning tasks on th e main principles an nd tools to solve a g	eir own using assistive technolo- d apply these in own programs. iven machine learning task in va-
Course	s (type	, number of weekly conta	ict hours, language —	- if other than Germa	in)
V (2) +	Ü (2)				
Metho ster, in	d of as format	sessment (type, scope, la ion on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
presen Langua credita	presentation of project results (approx. 40 minutes) Language of assessment: German and/or English creditable for bonus				
Allocat	ion of	places			
Additio	onal inf	ormation			
Focuse HCI,GE	s avail	able for students of the M	laster's programme li	nformatik (Computer	r Science, 120 ECTS credits):
Worklo	ad				
150 h					

LA Gymnasien	Computer Science	(2025)
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Teaching cycle

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

§ 22	ll Nr.	3 b)	

Module appears in
Master's degree (1 major) Computer Science (2016)
Master's degree (1 major) Mathematics (2016)
Master's degree (1 major) Computational Mathematics (2016)
Master's degree (1 major) Computer Science (2017)
Master's degree (1 major) Computer Science (2018)
Master's degree (1 major) Computational Mathematics (2019)
Master's degree (1 major) Mathematics (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Master's degree (1 major) Computer Science (2021)
Master's degree (1 major) Computational Mathematics (2022)
Master's degree (1 major) Mathematics (2022)
Master's degree (1 major) Computer Science (2023)
Master's degree (1 major) Computational Mathematics (2024)
Master's degree (1 major) Mathematics (2024)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Master's degree (1 major) Computer Science (2025)
First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module	title			Abbreviation	
Multimodal User Interfaces 10-HCI=MMUI-161-m01					no1
Module	e coordinator		Module offered by		
holder	of the Chair of Computer Scie	nce IX	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. cor	npl. of module(s)		
5	numerical grade				
Duratio	on Module level	Other prerequisites	i		
1 seme	ster graduate				
Conten	ts				
The multimodal interaction paradigm simultaneously uses various modalities like speech, gesture, touch, or gaze, to communicate with computers and machines. Basically, multimodal interaction includes the analysis as well as the synthesis of multimodal utterances. This course concentrates on the analysis, i.e., the input processing. Input processing has the goal to derive meaning from signal to provide a computerized description and understanding of the input and to execute the desired interaction. In multimodal systems, this process is interleaved between various modalities and multiple interdependencies exist between simultaneous utterances necessary to take into account for a successful machine interpretation. In this course, students will learn about the necessary steps involved in processing unimodal as well as multimo dal input. The course will highlight typical stages in multimodal processing. Using speech processing as a primary example, they learn about: A/D conversion Segmentation Syntactical analysis Segmentic analysis Segmentic analysis A specific emphasize will be on stages like morphology and semantic analysis. Typical aspects of multimodal interdependencies, i.e., temporal and semantic interrelations are highlighted and consequences for an algorithmic processing are derived. Prominent multimodal integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and semantic integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and semantic integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and semantic integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and semantic integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and semantic integration (aka multimodal fusion) approaches are described, interdependencies, i.e., temporal and sema					ultimodal in- nalgorithmic put proces- ption and un- s is interlea- nces neces- ll as multimo- ng as a prima-
After th	e course, the students will be	able to build their own	n multimodal interfac	ces. They will have a	broad under-
dent wi	ill learn about available tools	for reoccurring tasks a	nd their pros and cor	ic solutions for each	of them. Stu-
Course	s (type, number of weekly cor	ntact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)				
Metho ster, in	d of assessment (type, scope, formation on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
presen Langua credita	tation of project results (approge of assessment: German ar ble for bonus	ox. 40 minutes) nd/or English			
Allocat	ion of places				
Additional information					
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):					
Workload					
150 h	44				
LA Gymnas	ien Computer Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 13 / 171

Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22 II Nr. 3 b)				
Module appears in				
Master's degree (1 major) Computer Science (2016)				
Master's degree (1 major) Mathematics (2016)				
Master's degree (1 major) Computational Mathematics (2016)				
Master's degree (1 major) Computer Science (2017)				
Master's degree (1 major) Computer Science (2018)				
Master's degree (1 major) Computational Mathematics (2019)				
Master's degree (1 major) Mathematics (2019)				
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)				
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)				
Master's degree (1 major) Aerospace Computer Science (2020)				
Master's degree (1 major) Computer Science (2021)				
Master's degree (1 major) Aerospace Computer Science (2021)				
Master's degree (1 major) Computational Mathematics (2022)				
Master's degree (1 major) Mathematics (2022)				
Master's degree (1 major) Computer Science (2023)				
Master's degree (1 major) Aerospace Computer Science (2023)				
Master's degree (1 major) Computational Mathematics (2024)				
Master's degree (1 major) Mathematics (2024)				
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Master's degree (1 major) Computer Science (2025)				
Master's degree (1 major) Aerospace Computer Science (2025)				
First state examination for the teaching degree Gymnasium Computer Science (2025)				

Module	e title				Abbreviation
Real-Ti	ime Into	eractive Systems			10-HCI=RIS-182-m01
Modul	e coord	inator		Module offered by	
holder	of the (Chair of Computer Scienc	e IX	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	quisites	
1 seme	ester	graduate			
Conten	nts				
Reality tive Sy. The coi hands- concer What a RIS? W tual mo stem's and the part int Along t This in- compo solutio and res	r, compl stems (urse co on and ntrate o re the r hy is it odel of behavi e conse troduce the way cludes onent m ons. The search	After systems. Such system uter games, and cyber-ph (RIS) due to their commor vers theoretical models of novel solutions necessa n the conceptual principl main requirements? How important? What do we h the mission-critical aspec- or. The third part introdu equences these requirem- es some potential solution to the third part introdu equences these requirem- sone potential solution to the third part introdu equences these requirem- to some potential solution to the systems, scene to odels, and others. Novel theoretical and concept systems, e.g., X3D, instar	ns are typically found hysical systems. Late h aspects. lerived from the requ ry to tackle and fulfil es characterizing rea do we handle multip ave to do to assure t cts of time, latencies ces the application s ents have on decoup ns to data redundand state-of-the-art appro graphs, application g concepts like actor n ual discussions will b the treality. Unityad. Ur	in perceptual comp ly, these systems are irements of the appl l these requirements l-time interactive sys le modalities? How c imeliness? The secon , processes, and eve tate, it's requiremen ling and software qu cy, distribution, sync aches to reoccurring graphs (aka field rout nodels and ontologie pe put into a practica preal Engine 4, and S	e often termed Real-Time Interac- ication area as well as common . The first part of the course will stems. Questions answered are: to we define the timeliness of nd part will introduce a concep- nts necessary to describe a sy- ts of distribution and coherence, ality aspects in general. The last hronization, and interoperability. engineering tasks are discussed. ting), event systems, entity and es will be covered as alternative il context of today's commercial imulator X.
Intend	ed lear	ning outcomes	<u>, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,</u>		
After th physio gical cl can exp to solv to deve	ne cours logical haracte pect fro e a give elop alt	se, the students will have and psychological charac ristics of today's comput m today's technological en engineering task in thi ernative approaches for f	e a solid understandi cteristics of the huma er systems. Participa solutions. They will b s application area an future real-time intera	ng of the boundary c an users as well as b nts will gain a solid u e able to choose the d they will have a we active systems.	onditions defined by both, the y the architectures and technolo- understanding about what they appropriate approach and tools ell-founded basis enabling them
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)
V (2) +	Ü (2)				
Metho ster, in	d of ass Iformati	sessment (type, scope, la ion on whether module ca	nguage — if other than an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Focuse Cf. Sec	es availa tion 3 S	able for students of the N Subsection 3 Sentence 8	laster's programme l FSB (subject-specific	nformatik (Computer provisions).	Science, 120 ECTS credits): HCI.

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Workload

150 h

Teaching cycle

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

§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Computer Science (2018)

Master's degree (1 major) Information Systems (2019)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Computer Science (2021)

Master's degree (1 major) Information Systems (2022)

Master's degree (1 major) Computer Science (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Computer Science (2025)

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Modul	e title				Abbreviation	
Computational Geometry 10-I=AG-232-mo1						
Modul	e coord	inator		Module offered by		
holder	of the C	Chair of Computer Scier	ice I	Institute of Compute	er Science	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
5	numer	rical grade				
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
In man format algorit gorithr ve.	y areas ion syst hmic as ns and o	of computer science ems it is necessary to pects of these tasks: W data structures. Every to	for example robotics, o store, analyse, create /e will acquire techniqu echnique will be illustr	computer graphics, v or manipulate spati ues that are needed t ated with a problem	irtual reality and geo al data. This class is o plan and analyse g in the practical area	ographic in- about the geometric al- s listed abo-
Intend	ed learr	ning outcomes				
The stu metric based	udents a problen on the o	are able to decide which n. The students are able concepts and technique	h algorithms or data st e to analyse new probl es acquired in the lectu	ructures are suitable ems and to come up ıre.	for the solution of a with their own effici	given geo- ent solutions
Course	e s (type,	, number of weekly con	tact hours, language –	if other than Germa	n)	
V (2) +	Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English						
Allocat	tion of r	laces				
	· · · ·					
Additio	onal info	ormation				
Focuse AT,HCI	es availa ,GE,IN	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	redits):
Worklo	ad					
150 h						
Teachi	ng cycle	9				
Referre	ed to in	LPO I (examination reg	ulations for teaching-	legree programmes)		
§ 22	Nr. 3 b)	<u> </u>	<u> </u>	<u> </u>		
Modul	e annea	rs in				
Modul	e studie	us (Master) Computer S	cience (2010)			
Master Master Master Supple Master Master	e's degre f's degre f's teach ementar f's degre f's degre	ee (1 major) Computer S ee (1 major) Computatio ee (1 major) Mathematio ning degree Gymnasium y course MINT Teacher ee (1 major) Computer S ee (1 major) Mathematio	Science (2023) onal Mathematics (202 os (2024) MINT Teacher Educat Education PLUS, Elite Science (2025) cal Data Science (2025	4) ion PLUS, Elite Netwo Network Bavaria (ENI)	ork Bavaria (ENB) (20 3) (2025)	92 <u>5</u>)
LA Gymnas	sien Compu	iter Science (2025)	JMU Würzburg	• generated 18-Jun-2025 • ex	xam. reg.	page 17 / 171



Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module	title				Abbreviation	
Selected Topics in Games Engineering					10-I=AGE-232-m01	
Module	coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e IX	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Contents					
Selecte	d chap	ters of Games Engineerir	ig.			
Intende	ed lear	ning outcomes				
The stu comple	dents ı x prob	understand the basic app lems in this area and app	proach of games engi bly them to similar qu	neering. They are ab estions.	le to understand the solutions of	
Course	s (type	, number of weekly conta	ct hours, language –	if other than Germa	ın)	
V (2) +	Ü (2)					
Methoo ster, int	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
the top c) oral o d) oral Langua credital	ic) or examin examir ge of a ble for	ation of one candidate ea ation in groups of up to g ssessment: German and, bonus	ach (approx. 20 minu 3 candidates (approx /or English	tes) or . 15 minutes per can	didate)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse	s availa	able for students of the N	laster's programme li	nformatik (Computer	r Science, 120 ECTS credits): GE.	
Worklo	ad					
150 h						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 22 II Nr. 3 b)						
Module appears in						
Module	studie	es (Master) Computer Sci	ence (2019)			
Master	s degr	ee (1 major) Computer Sc	ience (2023)			
Master	s degr	ee (1 major) Computer Sc	ience (2025)	Commuter C : (
First sta	First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title				Abbreviation		
Selected Topics in Algorithms				10-I=AKA-232-m01		
Module	e coord	inator		Module offered by	·	
holder	of the (Chair of Computer Scienc	e l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	lts					
Selecte	ed topic	s in algorithmics.				
Intend	ed lear	ning outcomes				
The stu solutio	dents	understand the basic app omplex problems in this a	proach of algorithmic area and apply them	computer science. T to similar questions.	hey are able to understand the	
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass formati	s essment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writt	en exa	mination (approx. 60 to 1	20 minutes) or			
b) proj	ect wor	k (report (approx. 20 pag	es) with presentation	(30 to 45 minutes) a	and subsequent discussion on	
the top	oic) or					
c) oral	examin	lation of one candidate e	ach (approx. 20 minu 2 candidatos (approx	ites) or	didata)	
l angua	examining of a	ssessment. German and	or English	· 15 minutes per cam	uldate)	
credita	ble for	bonus				
Allocat	ion of _l	places				
Additio	onal inf	ormation				
Focuse AT	s availa	able for students of the N	laster's programme li	nformatik (Computer	Science, 120 ECTS credits):	
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	ars in				
Module	e studie	es (Master) Computer Sci	ence (2019)			
Master	's degr	ee (1 major) Computer Sc	ience (2023)			
Master	's degr	ee (1 major) Aerospace Co	omputer Science (20:	23)		
Master	's degr	ee (1 major) Computation	al Mathematics (202	4)		
Master	's degr	ee (1 major) Mathematics	5 (2024)			
Master	's teacl	hing degree Gymnasium l	WINT Teacher Education	ion PLUS, Elite Netwo	ork Bavaria (ENB) (2025)	
Supple	mentai	ry course MINT Teacher Ed	uucation PLUS, Elite l	vetwork Bavaria (EN	в) (2025)	
Master	's aegr	ee (1 major) Computer Sc	ience (2025)	25)		
First st	s uegr	mination for the teaching	degree Science (20)	25) Computer Science (c	2025)	
LIIST SL	First state examination for the teaching degree Gymnasium Computer Science (2025)					

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	data record Lehramt Gymnasien Informatik - 2025	

Module	title				Abbreviation
Selecte	d Topi	cs in Autonomous Mobile	e Systems		10-I=AKAMS-232-m01
Module	coord	inator		Module offered by	· · · · · · · · · · · · · · · · · · ·
Dean of	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Selecte	d topic	s in autonomous mobile	systems		
Intende	ed lear	ning outcomes			
Studen to comp	ts unde olex pre	erstand the basic approa oblems in this field and t	ch of autonomous mo ransfer them to relate	bbile systems. They ed issues.	are able to understand solutions
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	ın)
V (2) + I Module	Ü (2) e taugh	t in: German and/or Engli	ish		
Method ster, inf	l of ass formati en exa	sessment (type, scope, la ion on whether module ca mination (approx, 60 to 1	nguage — if other tha an be chosen to earn 20 minutes) or	an German, examina a bonus)	tion offered — if not every seme-
b) proje the top c) oral e d) oral e Langua credital	ect wor ic) or examin examir ge of a ble for	k (report (approx. 20 pag ation of one candidate ea ation in groups of up to g ssessment: German and/ bonus	es) with presentation ach (approx. 20 minu 3 candidates (approx. ⁄or English	(30 to 45 minutes) a tes) or . 15 minutes per can	and subsequent discussion on didate)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Focuses ES, KI.	s availa	able for students of the M	laster's programme lr	nformatik (Computer	r Science, 120 ECTS credits): LR,
Worklo	ad				
150 h					
Teachir	ıg cycl	e			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22 Nr. 3 b)					
Module appears in					
Master'	s degr	ee (1 major) Computer Sc	ience (2023)		
Master'	s degr	ee (1 major) Computer Sc	ience (2025)		
First sta	ate exa	mination for the teaching	degree Gymnasium	Computer Science (2	2025)

Module	title				Abbreviation
Selected Topics in Data Science					10-I=AKDS-232-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Selecte	d topic	s in data science			
Intende	ed learr	ning outcomes			
Studen blems i	ts unde n this f	erstand the basic approad ield and transfer them to	ch of data science. Tł related issues.	ney are able to under	rstand how to solve complex pro-
Courses	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Í Module	Ü (2) taught	t in: German and/or Engli	ish		
Method ster, inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
b) proje the topi c) oral e d) oral e Langua credital	ect worl ic) or examin examin ge of a ole for	k (report (approx. 20 pag ation of one candidate ea ation in groups of up to <u>3</u> ssessment: German and, bonus	es) with presentation ach (approx. 20 minu 3 candidates (approx ′or English	(30 to 45 minutes) a tes) or . 15 minutes per cano	and subsequent discussion on didate)
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Focuses	s availa	able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): KI
Worklo	ad				
150 h					
Teachir	ng cycle	e			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22 N	§ 22 Nr. 3 b)				
Module appears in					
Master's degree (1 major) Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Agrospace Computer Science (2025)					

LA Gymnasien	Computer Science	(2025)
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Module	title				Abbreviation
Selected Topics in Embedded Systems					10-I=AKES-232-m01
Module	coord	inator		Module offered by	
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Selecte	d topic	s in embedded systems.			
Intende	ed learr	ning outcomes			
The stu lutions	dents p to com	possess specialised know plex problems in this are	vledge in the area of a and to transfer the	embedded systems. n to related question	They are able to understand so- ns.
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Methoo ster, inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	in German, examina a bonus)	tion offered — if not every seme-
the top c) oral e d) oral Langua credital	ic) or examin examin ge of a ble for	ation of one candidate ea ation in groups of up to g ssessment: German and, bonus	ach (approx. 20 minu 3 candidates (approx. ′or English	tes) or 15 minutes per cano	didate)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Focuse	s availa	able for students of the M	laster's programme lr	nformatik (Computer	Science, 120 ECTS credits): ES.
Worklo	ad				
150 h					
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22	Vr. 3 b)				
Module appears in					
Module appears in Module studies (Master) Computer Science (2019) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Aerospace Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025)					

Module	title				Abbreviation
Selected Topics in HCI					10-I=AKHCI-232-m01
Module	coord	inator		Module offered by	
holder	of the (Chair of Computer Science	e IX	Institute of Compute	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Selecte	d topic	s in HCI.			
Intende	d lear	ning outcomes			
The stu solution	dents (ns to co	understand the basic app omplex problems in this a	proach of human-com area and to transfer th	puter interaction. Th nem to related quest	ey are able to understand the
Course	s (type	number of weekly conta	ct hours, language —	if other than Germa	n)
V(2) + 1	$\frac{1}{5}(2)$, <u>.</u>			,
Method ster, inf	l of ass formati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	n German, examina a bonus)	tion offered — if not every seme-
 a) written examination (approx. 60 to 120 minutes) or b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus 					and subsequent discussion on didate)
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Focuses	s availa	able for students of the M	aster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): HCI.
Worklo	ad				
150 h					
Teachir	ig cycl	6			
	<u> </u>				
Referre	d to in	LPOI (examination regu	lations for teaching-d	egree programmes)	
§ 22 N	۱r. 3 b)				
Module	appea	irs in			
Module studies (Master) Computer Science (2019) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Aerospace Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025)					
First sta	ite exa	mination for the teaching	degree Gymnasium	Computer Science (2	2025)

Module title				Abbreviation		
Selected Topics in Computer Science				10-I=AKII-232-m01		
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
5	nume	rical grade		<u> </u>		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
Selecte	ed topic	s in computer science.				
Intend	ed lear	ning outcomes				
The stu them to	idents a o relate	are able to understand th d questions.	e solutions to compl	ex problems in comp	outer science and to transfer	
Course	s (type	number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (2) +	Ü/S (2)	, , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , , ,		,	
Metho	d of ass	sessment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-	
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)		
a) writt b) proje the top c) oral d) oral	en exai ect wor vic) or examin examir	mination (approx. 60 to 1 k (report (approx. 20 pag ation of one candidate ea nation in groups of up to 3	20 minutes) or es) with presentatior ach (approx. 20 minu 3 candidates (approx	n (30 to 45 minutes) a ites) or . 15 minutes per can	and subsequent discussion on didate)	
Langua	ige of a	ssessment: German and	or English			
credita	ble for	bonus				
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h	-					
Teachi	ng cycl	е				
Teachi	ng cycle	e: if announced				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	ars in				
Module	e studie	es (Master) Computer Scie	ence (2019)			
Master	's degr	ee (1 major) Computer Sc	ience (2023)			
Master	's degr	ee (1 major) Aerospace Co	omputer Science (20	23)		
Master	Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)					
Master	's degr	ee (1 major) Artificial Inte	lligence (2024)			
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)					
Supple	mentai	y course MINT Teacher Ed	ducation PLUS, Elite I	Network Bavaria (EN	B) (2025)	
Master	's degr	ee (1 major) Computer Sc	ience (2025)	、 、		
Master	's degr	ee (1 major) Aerospace Co	omputer Science (20)	25)		
First st	ate exa	mination for the teaching	g aegree Realschule (computer Science (20	025)	
rirst st	First state examination for the teaching degree Gymnasium Computer Science (2025)					

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Module	title				Abbreviation	
Selected Topics in Intelligent Systems					10-I=AKIS-232-m01	
Module	coord	inator		Module offered by		
holder	of the Q	Chair of Computer Science	e VI	Institute of Compute	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Selecte	d topic	s in intelligent systems.				
Intende	ed learr	ning outcomes				
The stu lutions	dents p to com	possess an advanced kno plex problems in this are	owledge in the area o a and to transfer ther	f intelligent systems m to related question	. They are able to understand so- ns.	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) + İ	Ü (2)					
Method ster, inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	in German, examina [.] a bonus)	tion offered — if not every seme-	
c) oral e d) oral e Langua	ic) or examin examin ge of a ble for	ation of one candidate ea ation in groups of up to g ssessment: German and/ bonus	ach (approx. 20 minu 3 candidates (approx. ⁄or English	tes) or 15 minutes per cano	didate)	
Allocati	ion of p	olaces				
Additio	nal infe	ormation				
Focuses	s availa	able for students of the M	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): KI	
Worklo	ad					
150 h						
Teachir	ng cycl	9				
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
§ 22 N	Vr. 3 b)					
Module	appea	rs in				
Module studies (Master) Computer Science (2019) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Aerospace Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Computer Science (2025)						
First sta	Naster's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title Abbreviation						
Select	Selected Topics in Internet Technologies 10-I=AKIT-232-m01					
Modul	e coord	inator		Module offered by	• 	
holder	of the (Chair of Computer Scier	nce III	Institute of Comput	ter Science	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Durati	on	Module level	Other prerequisites	i		
1 seme	ester	graduate				
Conter	nts					
Selected topics in computer communication, for example design aspects of future internet structures: setup and control structures of the internet, multicast protocols, protocols for multimedia communication, optical net- works, control mechanisms for redundant and real-time communication networks, p2p networks, ad-hoc net- works, or new concepts and technologies in mobile communication: digital modulation, signal propagation, channel coding, modern transmission technologies (adaptive modulation and coding, hybrid ARQ, OFDM, MI- MO), mac layer, mobileIP, routing in ad-hoc networks, vertical handover, UMTS IP multimedia subsystem, or planning and management methods in telecommunication networks: planning methods (forward engineering, reverse engineering), network management paradigms (central and decentral), framework for network manage- ment (IETF traffic engineering, ITU-T TMN, OSI management), planning and management methods (IP manage- ment mechanisms, network design, measurement, acquisition and evaluation of traffic and performance data, visualisation, result handling, simulation and analysis of networks), management tools, outlook and perspecti- ves, or other current topics. Intended learning outcomes The students have a knowledge of advanced and current topics in the management and design of modern wired and wireless communication systems.						
V (2) +	Ü (2)	· · · ·				
Metho	d of ass	essment (type, scope,	 language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
a) writh b) proj the top c) oral d) oral Langua credita	 a) written examination (approx. 60 to 120 minutes) or b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) Language of assessment: German and/or English 					cussion on
Alloca	tion of p	olaces				
Additio	onal info	ormation				
Focuse	es availa	able for students of the	Master's programme l	nformatik (Compute	r Science, 120 ECTS (credits): IT.
Worklo	bad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)		
§ 22	§ 22 Nr. 3 b)					
Modul	e appea	ars in				
Modul Master	e studie r's degre	es (Master) Computer S ee (1 major) Computer S	cience (2019) Science (2023)			
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Master's degree (1 major) Aerospace Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025)

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Module title					Abbreviation	
Selected Topics in IT Security			10-I=AKITS-232-m01			
Module coordinator				Module offered by		
holder	of the (Chair of Computer Scienc	e ll	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Selecte	d topic	s in IT security.				
Intende	ed lear	ning outcomes				
The stu comple	dents ex prob	possess an advanced kno lems in this area and to t	owledge in the area o ransfer them to relate	f IT security. They are ed questions.	e able to understand solutions to	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
V (2) + Module	Ü (2) e taugh	t in: English				
Methoo ster, in	d of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
the top c) oral d) oral Langua credita	ic) or examin examir ige of a ble for	ation of one candidate ea ation in groups of up to g ssessment: English bonus	ach (approx. 20 minu 3 candidates (approx	ites) or . 15 minutes per can	didate)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse KI, LR, I	s availa HCI, ES	able for students of the N , SEC	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): SE,	
Worklo	ad					
150 h						
Teachir	ng cycl	e				
	-					
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
§ 22	Nr. 3 b)					
Module appears in						
Module Master Master Supple Master First sta	e studie 's degro 's teacl mentar 's degro 's degro ate exa	es (Master) Computer Scie ee (1 major) Computer Scie ee (1 major) Aerospace Co ning degree Gymnasium I ry course MINT Teacher Ec ee (1 major) Computer Sc ee (1 major) Aerospace Co mination for the teaching	ence (2019) ience (2023) omputer Science (202 MINT Teacher Educati ducation PLUS, Elite I ience (2025) omputer Science (202 g degree Gymnasium	23) ion PLUS, Elite Netwo Network Bavaria (EN 25) Computer Science (2	ork Bavaria (ENB) (2025) B) (2025) 2025)	

Module title					Abbreviation	
Selecte	Selected Topics in Aerospace Engineering 10-I=AKLR-232-mo1					
Module coordinator				Module offered by		
holder of the Chair of Computer Science		ce VII	Institute of Computer Science			
ECTS Method of grading		Only after succ. con	Only after succ. compl. of module(s)			
5 numerical grade			,,, , ,, ,, , ,, , ,, , , ,, , , , , , , , , , , , , , , , , , , ,			
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Selecte stems, and do tions, p cial are stems, ment, s traffic c Intende The stu conside Course V (2) + Method ster, init a) writt b) proje the top c) oral c d) oral Langua	ContentsSelected topics in aerospace engineering, for example: satellite communication, rocket science, propulsion systems, sensors and actuators for orientation control, perturbation of orbits, interplanetary orbits, rendezvous and docking, design of space ships, design of planetary bases, life support systems, special aspects of opera- tions, payloads, optical systems, RADAR, earth monitoring, thermo management, structure of space ships, special areas of navigation, space environment, environment simulation, verification and test of space faring systems, space astronomy and planet missions, space medicine and biology, material science, quality management, space law, aeroflight topics, avionics for airplanes, air traffic control, areal navigation, pilot interfaces, air traffic control, air traffic management.Intended learning outcomesThe students possess an advanced knowledge about the respective topic of the selected area and are able to consider these foundations in their future plans of air or spaceborne systems.Courses (type, number of weekly contact hours, language — if other than German)V (2) + Ü (2)Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)a) written examination (approx. 60 to 120 minutes) or b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or c) or al examination of one candidate each (approx. 20 minutes) or d) or al examination of one candidate each (approx. 20 minutes) or					
	ion of n					
 Additio	nal inf					
				6		
Focuse	s availa	able for students of the N	naster's programme l	nformatik (Computer	r Science, 120 ECTS (credits): LR.
Worklo	ad					
150 h						
Teachi	ng cyclo	e				
Referre	d to in	LPOI (examination regu	ulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	rs in				
Module studies (Master) Computer Science (2019)						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Aerospace Computer Science (2023)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
Master	's degre	ee (1 major) Computer So	cience (2025)			
LA Gymnas	ien Compu	iter Science (2025)	JMU Würzburg data record J	s • generated 18-Jun-2025 • e ehramt Gymnasien Informati	xam. reg. k - 2025	page 30 / 171



Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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Module title					Abbreviation	
Selected Topics in Computer Science and Sustainability			nd Sustainability		10-I=AKNA-232-m01	
Module coordinator				Module offered by		
Dean of	fStudi	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Selecte	d topic	s in computer science ar	nd sustainability			
Intende	ed lear	ning outcomes				
The stu solution	dents i ns to co	understand the basic app omplex problems in this a	proach of topics in su area and to apply the	stainability and IT. T m to similar questio	hey are able to understand the ns.	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	in)	
V (2) +	Ü (2)				,	
Module	e taugh	t in: German and/or Engl	ish			
Method ster, inf	l of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writte b) proje the top c) oral e d) oral e Langua credital	 a) written examination (approx. 60 to 120 minutes) or b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) Language of assessment: German and/or English 					
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuses	s availa	able for students of the N	laster's programme Ir	nformatik (Computer	r Science, 120 ECTS credits): IN	
Worklo	ad					
150 h						
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Master' Master' Supple Master'	Master's degree (1 major) Computer Science (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025)					

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 32 / 171
	data record Lehramt Gymnasien Informatik - 2025	

Module title				Abbreviation	
Selected Topics in Software Engineering				10-I=AKSE-232-m01	
Module coordinator				Module offered by	
holder	of the (Chair of Computer Scienc	e ll	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Selecte	ed topic	s in software engineering	5.		
Intende	ed learı	ning outcomes			
The stu	idents j	possess an advanced kno	owledge about select	ed aspects of softwa	are engineering.
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Method ster, in	d of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
the top c) oral d) oral Langua credita	ic) or examin examin ge of a ble for	ation of one candidate e ation in groups of up to g ssessment: German and, bonus	ach (approx. 20 minu 3 candidates (approx. /or English	tes) or . 15 minutes per cano	didate)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Focuse	s availa	able for students of the N	laster's programme lr	nformatik (Computer	Science, 120 ECTS credits): SE.
Worklo	ad		·		
150 h					
Teachi	ng cycl	e			
	0 . 7	-			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22	Nr. 3 b)		_		
Module appears in					
Module studies (Master) Computer Science (2019)					
Master's degree (1 major) Computer Science (2023)					
Master	Master's degree (1 major) Aerospace Computer Science (2023)				
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Supple	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Master	's degr	ee (1 major) Computer Sc	ience (2025)	``	
Master	's degr	ee (1 major) Aerospace Co	omputer Science (202	25)	
First sta	First state examination for the teaching degree Gymnasium Computer Science (2025)				

Module title					Abbreviation	
Select	Selected Topics in Theory 10-I=AKT-232-m01					
Module coordinator				Module offered by	Nodule offered by	
holder	holder of the Chair of Computer Science I		el	Institute of Computer Science		
ECTS	Method of grading Only after succ compl. of mod		npl. of module(s)			
5	numerical grade					
Duratio	n Module level		Other prerequisites			
1 seme	ester graduate					
Conter	its		I			
Selecte	ed topics in theory.					
Intend	ed learning outcomes					
The stu	Idents understand the ha	sic anr	proach of theoretical	computer science. T	hev are able to unde	erstand the
solutio	ns of complex problems i	n this a	area and apply them	to similar questions		
Course	es (type, number of weekly	y conta	ct hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho	d of assessment (type, sc	ope, la	nguage — if other th	an German, examina	tion offered — if not	every seme-
ster, in	formation on whether mo	dule ca	an be chosen to earn	a bonus)		,
a) writt	en examination (approx.	60 to 1	20 minutes) or			
b) proj	ect work (report (approx. :	20 pag	es) with presentatior	n (30 to 45 minutes)	and subsequent dis	cussion on
the top	oic) or		h (
c) oral	examination of one candi	date e	ach (approx. 20 minu 2 candidates (approx	Ites) or	(atchib	
Langua	age of assessment: Germa	an and	or English	. 15 minutes per can	uluale)	
credita	ble for bonus					
Allocat	tion of places					
Additio	onal information					
Focuse AT	es available for students o	of the N	laster's programme l	nformatik (Compute	r Science, 120 ECTS (credits):
Worklo	ad an					
150 h						
Teachi	ng cycle					
Referre	ed to in LPO I (examination	on regu	lations for teaching-	degree programmes)		
§ 22	Nr. 3 b)			<u></u>		
Modul	e annears in					
Modul	e studies (Master) Compu	ter Sci	ence (2010)			
Master	's degree (1 major) Comp	uter Sch	ience (2019)			
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Computational Mathematics (2024)						
Master's degree (1 major) Mathematics (2024)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
Master's degree (1 major) Computer Science (2025)						
Master's degree (1 major) Mathematical Data Science (2025)						
Master's degree (1 major) Aerospace Computer Science (2025)						
First st	ate examination for the te	eaching	g degree Gymnasium	Computer Science (2	2025)	
LA Gymnas	sien Computer Science (2025)		JMU Würzburg data record I	g • generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. ik - 2025	page 34 / 171

Module title					Abbreviation	
Approximation Algorithms 10-I=APA-161-m01						
Module coordinator Module offered by					<u> </u>	
holder of the Chair of Computer Science			nce l	Institute of Computer Science		
FCTS	CTS Mothod of grading		Only after succ. con	nl of module(s)		
c numerical grade						
Durati	name	Module level	Other prorequisites			
1 seme	ester	graduate				
Conter	nts	0				
The tas there a are use draftin practic greedy	sk of fin are man ed whic g and a al optir g, local s	ding the optimal solution y problems without and h do not always give the nalysing techniques for nisation problems, the search, scaling as well a	on for a given problem efficient algorithm for e optimal solution but r algorithms which hav lecture will introduce s as methods based on l	is omnipresent in co an optimal solution. always give good so e a proven approxim students to importan inear programming.	omputer science. Un As a result, in practi- lutions. This lecture lation quality. With t t drafting techniques	fortunately, ce, methods will discuss he help of s such as
Intend	ed lear	ning outcomes				
The stu damer gramm	udents a Ital draf Iing and	are able to analyse easy ting techniques such as I are able to apply these	/ approximation metho s greedy, local search e to new problems.	ods in terms of their o and scaling as well a	quality. They undersi s methods based or	tand fun- 1 linear pro-
Course	es (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass Iformati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written If anno examin prox. 1 Langua	examin ounced nation o 5 minut age of a oble for	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (a es per candidate). ssessment: German an bonus	o minutes). eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examination	tion may be replaced in groups of 2 cand	d by an oral idates (ap-
Allocat	tion of r	blaces				
Additio	onal inf	ormation				
Focuse AT,IT,G	es availa iE	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination reg	gulations for teaching-	degree programmes)		
§ 22 II Nr. 3 b)						
Modul	e appea	ars in				
Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master	's degr	ee (1 major) Computer S	science (2017)			
Master	's degr	ee (1 major) Computer S	science (2018)			
LA Gymnas	sien Compi	uter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e ehramt Gymnasien Informati	xam. reg. k - 2025	page 35 / 171

Module studies (Master) Computer Science (2019) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Mathematical Data Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

UNIVERSITÄT

WÜRZBURG
Module	e title				Abbreviation	
Automata Theory 10-I=AUT-212-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5	numei	rical grade				
Duratio	on l	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Finite a words, on of re	Finite automata, regular languages, star-free languages, natural equivalence relations, predicate logic with words, language acceptance through monoids, syntactic monoid, predicate logical and algebraic characterisati- on of regular languages and star-free languages, two-way automata.					
Intende	ed learr	ning outcomes				
The stu ges, sta monoio two-wa	idents p ar-free l ds, synt y autor	oossess a fundamental anguages, natural equ actic monoid, predicat nata.	and applicable knowle ivalence relations, pree e logical and algebraic	edge in the areas of f dicate logic with wor characterisation of r	finite automata, regu ds, language accepta regular and star-free	ılar langua- ance through languages,
Course	s (type,	number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
examin prox. 19 Langua Assess credita	examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus					
Allocat	ion of p	laces				
Additio	nal info	ormation				
Focuse IT, ES, I	s availa HCI, GE	ble for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits): AT,
Worklo	ad					
150 h						
Teachi	ng cycle	9				
Referre	d to in	LPO I (examination reg	ulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	rs in				
Master	's degre	ee (1 major) Computer S	Science (2021)			
Master	Master's degree (1 major) Computational Mathematics (2022)					
Master	's degre	ee (1 major) Mathemati	cs (2022)			
Master	's degre	ee (1 major) Computer S	Science (2023)			
Master	's degre	ee (1 major) Computatio	onal Mathematics (202	4)		
Master	's degre	ee (1 major) Mathemati	cs (2024)			
Master	's teach	ning degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	025)
Supple	mentar	y course MINI Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2025)	page 27 / 171
LA Gymnas	ien compt	iter Science (2025)	data record	s • generateu 18-jun-2025 • e _ehramt Gymnasien Informati	лані. тед. k - 2025	page 37 / 171



Master's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 38 / 171
	data record Lehramt Gymnasien Informatik - 2025	1

Module	e title				Abbreviation	
Computability Theory 10-I=BER-212-m01						
Module	e coord	inator		Module offered by		
holder	of the C	Chair of Computer Scier	nce l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Gödel r and pro	number oductiv	ing, computable functi e sets, relative comput	ons, decidable and co ability, Turing reductio	untable sets, halting n, countable degrees	problem, m-reducib 5, arithmetic hierarch	ility, creative ıy.
Intende	ed learr	ning outcomes				
The stu ons, de tability	idents p ecidable , Turing	possess a fundamental e and countable sets, h greduction, countable o	and applicable knowle alting problem, m-redu degrees, arithmetic hie	edge in the areas of ucibility, creative and rarchy.	Gödel numbers, cou I productive sets, re	ntable functi- lative compu-
Course	s (type,	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester creditable for bonus						
Allocat		llaces				
Additio Focuse	s availa	ormation able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS (credits):
AT,SE,I	T,KI,GE					
worklo	ad					
150 h						
Teachi	ng cycl	9				
				l		
Referre		LPUT (examination reg	gulations for teaching-	uegree programmes)		
§ 22	Nr. 3 b)	•				
Module	e appea	irs in				
Master	Master's degree (1 major) Computer Science (2021)					
Master's degree (1 major) Computational Mathematics (2022)						
Master	's degre	ee (1 major) Mathemati	CS (2022) Science (2022)			
Master	s uegi 's deor	e (1 major) Computer :	onal Mathematics (2023)			
Master	's degre	ee (1 major) Mathemati	cs (2024)	.4)		
Master	's teach	ning degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	025)
Supple	mentar	y course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2025)	<i></i>
Master	's degre	ee (1 major) Computer S	Science (2025)			
LA Gymnas	ien Compu	uter Science (2025)	JMU Würzburg data record l	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 39 / 171



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	data record Lehramt Gymnasien Informatik - 2025	

Module	e title				Abbreviation
Databa	Databases 2 10-I=DB2-242-m01				
Module	e coord	inator		Module offered by	
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Data wa	Data warehouses and data mining; web databases; introduction to Datalog.				
Intende	ed learr	ning outcomes			
The stu	dents ł	nave advanced knowledg	e about relational da	tabases, XML and da	ata mining.
Course	s (type,	, number of weekly conta	ct hours, language —	· if other than Germa	n)
V (2) + I Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Method	d of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
ster, m	ionnati			a Dollus)	
Written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English					
Allocat	ion of p	laces			
Additio	nal info	ormation			
Focuses KI, HCI	s availa	able for students of the N	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): SE,
Worklo	ad				
150 h					
Teachir	ng cycl	9			
Teachir	ng cycle	e: every year, summer ser	nester		
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22	Nr. 3 b)				
Module	e appea	rs in			
Master Master Supple Master Master First sta	Module appears in Master's degree (1 major) Artificial Intelligence (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)				

Module	e title				Abbreviation	
Deductive Databases 10-I=DDB-212-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Compute	er Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	numei	rical grade		• • • • •		
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	its					
Syntax relation program	and se nal data ms: reci	mantics of definite and bases; Evaluation met ursion, equivalence, tra	l normal logic program hods for Datalog; Nega ansformation; Outlook	s; Model, proof, and ation and stratificatic on disjunctive logic	fixpoint theory; Con on; Structural proper programs.	nection to ties of logic
Intend	ed learr	ning outcomes				
The stu They ar their eo	The students have fundamental and practicable knowledge about Datalog (including negation). They are able to compactly implement declarative programs in Datalog and to compare existing programs w.r.t. their equivalence and other properties.					
Course	s (type,	number of weekly cor	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme-					
examir prox. 19 Langua credita	examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
Allocat	ion of p	olaces				
 Additic	nal info	ormation				
Focuse	s availa T,KI	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachi	ng cycl	a				
Teachi	ng cycle	-	emester			
Poforro	d to in	IPOL (ovamination ro	sulations for toaching	dograa programmac)		
S an II				degree programmes)		
9 22 11	Nr. 3 D)	•				
Module	e appea		~ : ()			
Master	's degre	ee (1 major) Computer	Science (2021)			
Master	Master's degree (1 major) Computational Mathematics (2022)					
Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2022)						
Master	's degre	ee (1 major) Artificial In	telligence (2023)			
Master	's degre	ee (1 major) Computati	onal Mathematics (202	24)		
Master	's degre	ee (1 major) Mathemati	cs (2024)	12		
Master	's teach	ning degree Gymnasiur	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	025)
Supple	ementar	y course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2025)	
LA Gymnas	ien Compu	iter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 42 / 171



Master's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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Modu	e title			Abbreviation		
Deep l	Deep Reinforcement Learning for Intelligent Space Systems					
Modu	e coordinator		Module offered by			
Dean	of Studies Informatik (Comput	er Science)	Institute of Comput	er Science		
ECTS	Method of grading	Only after succ. cor	npl. of module(s)			
5	numerical grade					
Durati	on Module level	Other prerequisites	5			
1 seme	ester graduate					
Conte	nts					
 Key Concepts in Reinforcement Learning Exact Methods for Finite Markov Decision Processes Tabular Reinforcement Learning Planning and Learning with Tabular Methods Approximation Methods and Deep Reinforcement Learning Policy Optimization Value-Based Methods Applying Reinforcement Learning and Practical Tips and Tricks Aerospace Applications Model-Based Reinforcement Learning 						
•	Frontiers and Future of Deep R	einforcement Learning				
Intended learning outcomes						
Students understand the basics of reinforcement learning & deep reinforcement learning (model-free & mo- del-based). They understand current challenges and unsolved problems. They are able to use standard algo- rithms for (continuous) control tasks and have learned about aerospace applications.						
V (2) +	Ü (2)					
Modul	e taught in: German and/or Er	nglish				
Metho ster, in	d of assessment (type, scope nformation on whether module	, language — if other th e can be chosen to earn	an German, examina a bonus)	ition offered — if not	every seme-	
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					d by an oral idates (ap-	
Alloca	tion of places					
Additi	onal information					
Workl	oad					
150 h	150 h					
Teach	Teaching cycle					
Teach	ng cycle: every year, summer	semester				
Referr	ed to in LPO I (examination re	gulations for teaching-	degree programmes)			
Modu	e appears in					
Maste	r's degree (1 major) Aerospace	Computer Science (20	25)			
LA Gymna	sien Computer Science (2025)	JMU Würzbur data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informat	exam. reg. ik - 2025	page 44 / 171	



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	data record Lehramt Gymnasien Informatik - 2025	1

Module	e title				Abbreviation
Exact A	lgorith	ms			10-I=EA-252-m01
Module	e coord	inator		Module offered by	
				Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster				
Conten	ts				
Intende	ed lear	ning outcomes			
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
V (2) + Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Metho ster, in	d of ass formati	essment (type, scope, la on on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
lf anno examin prox. 19 Langua credita	written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for banus				
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Focuse	s availa	able for students of the N	laster's programme li	nformatik (Computer	r Science, 120 ECTS credits): AT
Worklo	ad				
150 h					
Teachi	ng cycl	е			
Referre	ed to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
§ 22	Nr. 3 b)				
Module	e appea	ars in			
Master First sta	's degr ate exa	ee (1 major) Computer Sc mination for the teaching	ience (2025) g degree Gymnasium	Computer Science (2	2025)

Energy Informatics 1 10-I=E(1:232: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) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Model ing of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intende learning outcomes	Module	title				Abbreviation
Module coordinator Module offered by holder of the Chair of Computer Science III Institute of Computer Science ECTS Meth-of grading Only after succ. compl. of module(s) 5 num=rical grade Duratior Module level Other prerequisites 1 semester graduate Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Model management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended tearming outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems wi moder Soudenter flexible loads. They will also be able to identify opportunities, risks and challenges of the energy traisition as well as tor line integration of renewable energies, energy torage, electric vehicles, heat upmp, and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy traisition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language – if other than German) V (2) + 0 (2) Module ta	Energy	Energy Informatics 1 10-I=El1-232-m01				
holder of the Chair of Computer Science III 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 Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Model (ing of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended Learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power grids (smart grids) as well as for the integration of renewable energies, energy storage, electric vehicles, heat pump and other flexible loads. They will also be able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + 0 (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination of flexeed by an ora examination of or enveal or a bouns) If announced by the lecturer at the beginning of the course, the written examination in groups of 2 candidates (approx. 5 minutes) or an oral examination in groups of 2 candidates (approx. 5 minutes) er candidate)<	Module	coordi	inator		Module offered by	
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Modeling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems with order and systems will also be able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Û (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination in groups of 2 candidates (approx. 20 minutes) let not set a bonus) Allocational information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Work	holder	of the C	Chair of Computer Science	e III	Institute of Comput	er Science
5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Modeling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy transition an optimization methods for the understand thours, language — if other than German) V (2) + Û (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).	ECTS Method of grading Only after succ.			Only after succ. com	pl. of module(s)	
Duration Module level Other prerequisites 1 semester graduate Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Modeling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems wi modern software tools. In addition, they are able to interpret and evaluate concepts for intelligent power grids and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy traisition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + 0 (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination of pore candidate each (approx. zo minutes) If announced by the lecturer at the beginning of the course, the written examination in groups of z candidates (approx. zo minutes) or an oral examination in groups of z candidates	5	numer	rical grade			
1 semester [raduate] Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Model ling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation any optimization methods for the analysis of sustainable energy systems and are able to model energy systems windown software tools. In addition, they are able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as for the integration of renewable energies, energy storage, electric vehicles, heat pumps and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy transition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of places Allocation of places Allocation of places	Duratio	n	Module level	Other prerequisites		
Contents Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Model ling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems is modern software tools. In addition, they are able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as for the integration of renewable energies, energy storage, electric vehicles, heat pumps and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy transition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Û (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of ne candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English credit	1 semes	ster	graduate			
Fundamentals of physical units; Fundamentals of the structure of energy systems and their components; Modeling of energy systems; Energy markets; Components of intelligent power grids and smart grids; Demand side management and flexible consumers; Virtual power plants; Sector coupling; Current research topics Intended learning outcomes Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems wi modern software tools. In addition, they are able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as for the integration of renewable energies, energy storage, electric vehicles, heat pumps and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy transition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Û (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 20 minutes) or an oral examination in groups of 2 can	Conten	ts				
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Students understand the basic structure of energy systems and their components (wind and PV plants, power plants, electricity grids, consumers, storage technologies and markets). They can use modeling, simulation an optimization methods for the analysis of sustainable energy systems and are able to model energy systems will modern software tools. In addition, they are able to interpret and evaluate concepts for intelligent power grids (smart grids) as well as for the integration of renewable energies, energy storage, electric vehicles, heat pump: and other flexible loads. They will also be able to identify opportunities, risks and challenges of the energy traisition as well as the role of informatics in this context. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Ü (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload	Intende	ed learn	ning outcomes			
Courses (type, number of weekly contact hours, language — if other than German) V (2) + Ü (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	plants, optimiz modern (smart s and oth sition a	electric ation n softwa grids) a ner flexi s well a	rstand the basic structur city grids, consumers, sto nethods for the analysis of are tools. In addition, the is well as for the integrati ble loads. They will also as the role of informatics	or age technologies ar or sustainable energy y are able to interpre ion of renewable ene be able to identify op in this context.	and their componen nd markets). They ca / systems and are ab t and evaluate conce rgies, energy storage oportunities, risks an	n use modeling, simulation and ole to model energy systems with epts for intelligent power grids e, electric vehicles, heat pumps od challenges of the energy tran-
V (2) + Ü (2) Module taught in: German and/or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	Courses	s (type,	number of weekly conta	ct hours, language —	· if other than Germa	n)
Method of assessment (type, scope, language — if other than German, examination offered — if not every sem ster, information on whether module can be chosen to earn a bonus) written examination (approx. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	V (2) + Í Module	V (2) + Ü (2) Module taught in: German and/or English				
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an ora examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	Method ster, inf	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)				
Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	Allocati	ion of p	olaces			
Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle						
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN Workload 150 h Teaching cycle	Additio	nal info	ormation			
Workload 150 h Teaching cycle	Focuses	s availa	able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): IN
150 h Teaching cycle	Worklo	ad				
Teaching cycle	150 h					
	Teachir	ng cycle	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)	Referre					
§ 22 Nr. 3 b)	§ 22 N	Vr. 3 b)				
Module appears in	Module	appea	rs in			
Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)	Master' Master' Master' Master' First sta	s degre s degre s degre s degre ate exar	ee (1 major) Computer Sci ee (1 major) Computation ee (1 major) Mathematics ee (1 major) Computer Sci mination for the teaching	ience (2023) al Mathematics (202 (2024) ience (2025) degree Gymnasium	4) Computer Science (2	2025)

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Module title			Abbreviation		
Embed	ded Systems			10-l=ES-231-m01	
Modul	e coordinator		Module offered by	<u> </u>	
Dean of Studies Informatik (Computer Science)		Institute of Comput	er Science		
ECTS	Method of grading	Only after succ. cor	npl. of module(s)		
5	numerical grade		<u> </u>		
Duratio	on Module level	Other prerequisites	i		
1 seme	ester graduate				
Conter	its	l			
Models system re synt	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.				
Intend	ed learning outcomes				
The stu most in softwa	udents are familiar with the te mportant techniques for the m re.	chnical possibilities fo odelling, verification a	r the design of embe nd optimisation of s	dded systems and m uch systems in hardv	aster the ware and
Course	es (type, number of weekly co	ntact hours, language -	– if other than Germa	in)	
V (2) + Modul	Ü (2) e taught in: German and/or Er	nglish			
Metho ster, in	d of assessment (type, scope formation on whether module	, language — if other th e can be chosen to earr	an German, examina 1 a bonus)	tion offered — if not	every seme-
examir prox. 1 Langua credita	nation of one candidate each 5 minutes per candidate). age of assessment: German a ble for bonus	(approx. 20 minutes) o nd/or English	r an oral examinatior	i in groups of 2 cand	idates (ap-
Allocat	tion of places				
Addition Focuse AT,SE,I	es available for students of the ES,LR,GE	e Master's programme	nformatik (Compute	r Science, 120 ECTS (credits):
Worklo	bad				
150 h		-			
Teachi	ng cycle				
Referre	ed to in LPO I (examination re	gulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)	<u> </u>	<u> </u>		
Modul	e appears in				
Master	r's degree (1 major) Computer	Science (2023)			
Master	r's degree (1 major) Computat	ional Mathematics (202	24)		
Master	r's degree (1 major) Mathemat	ics (2024)			
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Supple	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Master's degree (1 major) Computer Science (2025)					
First st	ate examination for the teach	ing degree Gymnasium	Computer Science (*	2025)	
LA Gymnas	sien Computer Science (2025)	JMU Würzbur data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informat	xam. reg. ik - 2025	page 48 / 171

LA Gymnasien Computer Science (2025)

Module	Module title Abbreviation				
Image	Proces	sing and Computational I	Photography		10-I=IP-222-m01
Module	e coord	inator		Module offered by	
holder	of the (Chair of Computer Scienc	e IV	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Contents				
This course aims at offering a self-contained account of image processing and computational photography and its underlying concepts, including the recent use of deep learning. The topics that will be covered are: introduction to image processing and computational photography sampling and quantization light and color image acquisition deep learning generative methods image restoration sensor and image quality assessment image compression applications Intended learning outcomes Students have fundamental knowledge of problems and techniques in the field of image processing and computational photography suitable methods for concrete problems. Overview of the most important concepts of image formation, perception and analysis, and Computational photography					
• P	rovidin	g a sound solid backgrou	ind knowledge for th	e Computer Vision c	ourses
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)
V (2) + Module	Ü (2) • taugh	t in: English			
Metho	d of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	,
written If anno examin prox. 19 Langua credita	written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: English				
Allocat	ion of p	olaces			
Additional information					
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Teachi	ng cycle	e: every year, winter seme	ester		
	_ /				

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Referred to in LPO I	(examination	regulations	for teaching-degree programmes))
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§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Information Systems (2019) Master's degree (1 major) eXtended Artificial Intelligence (xtAl) (2020) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Aerospace Computer Science (2023) Master's degree (1 major) Artificial Intelligence & Extended Reality (2024) Master's degree (1 major) Artificial Intelligence (2024) Master's degree (1 major) Information Systems (2024) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Mathematical Data Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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Module title				Abbreviation	
Information Retrieval			10-I=IR-242-m01		
Module	e coord	inator		Module offered by	
holder	ofthe	Chair of Computer Scienc	e XII	Institute of Comput	er Science
ECTS	Methe	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
IR mod data str ges and thods t	els (e. ructure d parac o supp	g. Boolean and vector spa es (e. g. inverted index), q ligms, structured queries ort IR (e. g. recommendat	ace model, evaluatior uery elements (e.g. c), search engine (e.g tion systems, text clu	n), processing of tex query operations, rel . architecture, crawli stering and classific	t (tokenising, text properties), evance feedback, query langua- ing, interfaces, link analysis), me- ation, information extraction).
Intende	ed lear	ning outcomes			
Studen how to	ts acqu build a	uire theoretical and pract a search engine.	ical knowledge in the	field of information	retrieval and the technical know-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Method	d of ass	sessment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
ster, in	format	ion on whether module ca	an be chosen to earn	a bonus)	
lf anno examin prox. 19 Langua credita	unced ation of 5 minut ge of a ble for	by the lecturer at the beg of one candidate each (ap tes per candidate). Issessment: German and, bonus	/or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of _l	places			
Additio	nal inf	ormation			
Focuse IT, KI, H	s availa ICI, GE	able for students of the N	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits):
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Teachir	ng cycl	e: every year, summer ser	nester		
Referre	d to in	LPO I (examination regu	lations for teaching-d	legree programmes)	
§ 22	Nr. 3 b)				
Module	e appea	ars in			
Master	's degr	ee (1 major) Artificial Inte	lligence (2024)		
Master	's degr	ee (1 major) Information S	Systems (2025)		
Master	's degr	ee (1 major) Computer Sc	ience (2025)		
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)

Module title				Abbreviation			
Compu	tationa	l Complexity II			10-I=KT2-212-m01		
Module	e coord	inator		Module offered by	Module offered by		
holder	of the C	Chair of Computer Scier	ice l	Institute of Comput	er Science		
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)			
5	numei	rical grade					
Duratio	on l	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
Propert ty of pr	ties of N obabili	IP-complete sets, autor stic algorithms.	educibility, interactive	e proof systems, poly	nomial time hierarch	ny, complexi-	
Intende	ed learr	ning outcomes					
The stu autored	ıdents p ducibili	oossess a fundamental ty, interactive proof sys	and applicable knowl tems, polynomial time	edge in the areas of hierarchies, comple	properties of NP-con exity of probabilistic	nplete sets, algorithms.	
Course	s (type.	number of weekly con	tact hours, language –	- if other than Germa	n)		
V (2) +	Ü (2)						
Metho ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-	
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester							
credita	ble for	bonus					
		Jaces					
Additio	onal info	ormation					
Focuse SE, IT, I	s availa ES	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits): AT,	
Worklo	ad						
150 h							
Teachi		2					
Teacini	ing cycli	-					
Referre	ed to in	LPO I (examination reg	ulations for teaching-	degree programmes)			
§ 22	Nr. 3 b)						
Module	e appea	rs in					
Master	's degre	ee (1 major) Computer S	Science (2021)				
Master	's degre	ee (1 major) Computatio	onal Mathematics (202	2)			
Master	's degre	ee (1 major) Mathemati	cs (2022)				
Master	's degre	ee (1 major) Computer S	Science (2023)				
Master	's degre	ee (1 major) Computatio	onal Mathematics (202	.4)			
Master	's degre	ee (1 major) Mathemati	cs (2024)				
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)							
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)							
Master's degree (1 major) Computer Science (2025)							
First sta	ate exa	mination for the teaching	ng degree Gymnasium	Computer Science (2	2025)		
LA Gymnas	ien Compu	iter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 52 / 171	

Module title				Abbreviation		
Logic Programming 10-I=LP-212-m01						
Modul	e coord	inator		Module offered by	·	
holder	of the (Chair of Computer Scie	nce VI	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
Conter	nts	graduate				
Logic-r progra gregati cepts l	Logic-relational programming paradigm, top-down evaluation with SLD(NF) resolution. Introduction to the logic programming language Prolog: recursion, predicate-oriented programming, backtracking, cut, side effects, ag-gregations. Connection to (deductive) databases. Comparison with Datalog, short introduction of advanced concepts like constraint logic programming.					
Intend	ed lear	ning outcomes				
The stu compa gramm	udents ict and iing par	have fundamental and declarative programs iı adigm.	practicable knowledge Prolog, and to compa	of logic programmir re this approach to t	ng. They are able to in he traditional imperation in the second sec	mplement ative pro-
Course	es (type	, number of weekly cor	itact hours, language –	- if other than Germa	in)	
V (2) +	Ü (2)					
Metho ster, in	d of ass Iformati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
examir prox. 1 Langua credita	nation o 5 minut age of a able for	of one candidate each (ses per candidate). ssessment: German ar bonus	approx. 20 minutes) oi nd/or English	r an oral examinatior	i in groups of 2 cand	idates (ap-
Allocat	tion of _l	olaces				
Focuse	es availa T,KI	ormation able for students of the	Master's programme I	nformatik (Compute	r Science, 120 ECTS (credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Teachi	ng cycle	e: every year, winter se	mester			
Referre	ed to in	LPOI (examination re	gulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
Modul	e appea	urs in				
Master's degree (1 major) eXtended Artificial Intelligence (xtAl) (2020) Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Artificial Intelligence & Extended Reality (2024) Master's degree (1 major) Artificial Intelligence (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Payeria (ENP) (2005)						
Supple	ementa	y course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2025)	
LA Gymnas	sien Comp	uter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 53 / 171



Master's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module title Abbreviation						
Perfor	Performance Evaluation of Distributed Systems 10-I=LVS-232-m01					
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scien	ce III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade		• • • •		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its					
The performance evaluation of distributed systems is illustrated and practically performed on a contemporary ex- ample, e.g., the Internet of Things (IoT). The following topics will be conveyed: Traffic theoretic models, fundamental concepts of theory of probability, transformation techniques, stochastic processes, methods for performance analysis of technical systems, queuing and traffic theory, discrete-time and continuous Markov chains, analysis of Markov and non-Markov systems, practical examples for performance evaluation of computer systems and networks: service quality and other characteristics.						
Intend	ed learr	ning outcomes				
The stu means	idents p of the t	bossess the methodic ki heory of probability and	nowledge and the pra I mathematical statist	ctical skills necessar ics.	y to model technical	systems by
Course	e s (type,	number of weekly cont	act hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap-						
Langua credita	age of a ble for	ssessment: German and bonus	l/or English			
Allocat	ion of p	olaces				
Additio	onal info	ormation				
Focuse AT,IT,G	s availa E,IN	able for students of the I	Naster's programme l	nformatik (Computer	Science, 120 ECTS c	redits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
Module appears in						
Modul	e studie	s (Master) Computer Sc	ience (2019)			
Master	's degre	ee (1 major) Computer S	cience (2023)			
Master	's degre	ee (1 major) Aerospace (Computer Science (20	23)		
Master's degree (1 major) Computational Mathematics (2024)						
Master's degree (1 major) Mathematics (2024)						
Master	's teacł	ning degree Gymnasium	MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	025)
Supple	ementar	y course MINT Teacher E	Education PLUS, Elite	Network Bavaria (EN	B) (2025)	
Master	's degre	ee (1 major) Computer S	cience (2025)			nonc /
LA Gymnas	sien compi	iter Science (2025)	JMU Wurzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 55 / 171



Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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Module title				Abbreviation	
Medical Informatics 10-I=MI-212-m01					
Module	e coordinator		Module offered by		
holder	of the Chair of Computer Sc	ience VI	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. cor	npl. of module(s)		
5	numerical grade		• • • •		
Duratio	on Module level	Other prerequisites			
1 seme	ster graduate				
Conten	ts				
Electro mary a cal rese	nic patient folder, coding of nd functional units, medica earch, case-based training s	medical data, hospital i decision making and as ystems in medical traini	nformation systems, sistance systems, st ng.	operation of comput atistics and data mir	ters in infir- ning in medi-
Intende	ed learning outcomes				
The stu medici	idents possess theoretical a	nd practical knowledge	about the applicatior	n of computer scienc	e methods in
Course	s (type, number of weekly c	ontact hours, language -	– if other than Germa	n)	
V (2) +	Ü (2)				
Methoo ster, in	d of assessment (type, scop formation on whether modu	e, language — if other th le can be chosen to earr	an German, examina a bonus)	tion offered — if not	every seme-
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for benue					
Allocat	ion of places				
	· · ·				
Additio	nal information				
Focuse	s available for students of t ICI, GE	he Master's programme l	nformatik (Computer	Science, 120 ECTS (credits): SE,
Worklo	ad				
150 h					
150 m					
Teachi					
Referre	ed to in LPO I (examination	regulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)				
Module	e appears in				
Master	's degree (1 major) Compute	er Science (2021)			
Master	's degree (1 major) Computa	ational Mathematics (202	22)		
Master	's degree (1 major) Informat	ion Systems (2022)			
Master	's degree (1 major) Mathem	atics (2022)			
Master	's degree (1 major) Compute	er Science (2023)			
Master	's degree (1 major) Computa	tional Mathematics (202	24)		
Master	's degree (1 major) Mathem	atics (2024)			
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)					
Supple	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)				
Master	's degree (1 major) Compute	er Science (2025)			
LA Gymnas	ien Computer Science (2025)	JMU Würzbur data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 57 / 171



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	data record Lehramt Gymnasien Informatik - 2025	1

Module	title	_			Abbreviation	
Music Information Retrieval				10-I=MIR-252-m01		
Module	coord	inator		Module offered by		
Dean of	Studie	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Content	ts					
Music re time-fre view an structur nities/n Intende	eprese equenc d in-de re anal nusico d lear dents l	troduces the research fie ntations (graphical, syml y transformations, varian epth study of individual A ysis, genre/style classific logy ning outcomes nave a fundamental unde	Id of Music Information polic, audio), basic m its of the Fourier trans AIR tasks (e.g., harmo cation), data preparat	epresentations and specialized	audio data as well as theoretical	
They ha rithms.	ve gai	ned experience with typic	cal MIR tasks and are	able to understand,	develop, and apply MIR algo-	
Courses	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) + Ü Module	J (2) taugh	t in: German and/or Engl	ish			
Method ster, inf	l of ass ormati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writte b) oral e c) oral e Languas creditat	en exar examin examin ge of a ole for	nination (approx. 60 to 1 ation of one candidate e ation in groups of up to 3 ssessment: German and, bonus	20 minutes) or ach (approx. 20 minu 3 candidates (approx. ⁄or English	tes) or 15 minutes)		
Allocati	on of p	olaces				
Additio	nal inf	ormation				
Focuses	availa	able for students of the N	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): GE	
Workloa	ad					
150 h						
Teachin	Teaching cycle					
Teaching cycle: every year, summer semester						
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
§ 22 N	§ 22 Nr. 3 b)					
Module appears in						
Master's Master's First sta	s degro s degro ite exa	ee (1 major) Computer Sc ee (1 major) Mathematica mination for the teaching	ience (2025) Il Data Science (2025) degree Gymnasium) Computer Science (2	2025)	

Module title				Abbreviation		
Mathe	Mathematical Logic 10-I=ML-212-m01					
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scie	nce l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
Propos rem, G	itional ödel's i	logic, first-order predic ncompleteness theore	ate logic, proof and de m, undecidability and r	duction, Gödel's con Ionaxiomatisability o	npleteness theorem, of elemental arithme	Tarski theo- tic.
Intend	ed learı	ning outcomes				
The stu predica theore	idents j ate logi m, unde	oossess a fundamenta c, proof and deduction ecidability and nonaxic	l and applicable knowle , Gödel's completeness matisability of elemen	edge in the areas of 5 theorem, Tarski the tal arithmetic.	propositional logic, f orem, Gödel's incon	first-order npleteness
Course	s (type	, number of weekly cor	itact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
If anno examir prox. 19 Langua Assess credita	unced nation o 5 minut age of a ment o ble for	by the lecturer at the b f one candidate each (es per candidate). ssessment: German ar ffered: In the semester bonus	eginning of the course, approx. 20 minutes) or id/or English in which the course is	the written examina an oral examination offered and in the su	tion may be replaced in groups of 2 cand Ibsequent semester	d by an oral idates (ap-
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Focuse AT,SE,F	s availa <i,es< td=""><td>able for students of the</td><td>Master's programme I</td><th>nformatik (Computer</th><td>Science, 120 ECTS of</td><th>credits):</th></i,es<>	able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS of	credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
		-				
Referre	ed to in	LPOI (examination re	 gulations for teaching-o	degree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	irs in				
Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024)						
Master Supple Master	s teach mentar 's degro	ning degree Gymnasiur y course MINT Teacher ee (1 major) Computer	n MINT Teacher Educat Education PLUS, Elite Science (2025)	ion PLUS, Elite Netwo Network Bavaria (EN	огк Bavaria (ENB) (20 В) (2025)	525)
LA Gymnas	ien Compi	uter Science (2025)	JMU Würzburg data record I	g ● generated 18-Jun-2025 ● e ehramt Gymnasien Informati	xam. reg. k - 2025	page 60 / 171



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	data record Lehramt Gymnasien Informatik - 2025	

	Module	title			Abbreviation
	Machin	e Learning for Networks 1			10-I=MLN1-232-m01
	Module	coordinator		Module offered by	<u> </u>
holder of the Chair of Computer Science X			e XV	Institute of Comput	er Science
	ECTS	Method of grading	Only after succ. con	npl. of module(s)	
5 numerical grade					
	Duratio	n Module level	Other prerequisites		
	1 semes	ster graduate			
	Content	ts			
	Network formatic cal syst is the ro these st influent work to Address for the s practica ty meas of comp stic dyn terial co which in their kn written	ks matter! This holds for techni on systems and social media ir ems. What can we learn from d ole of individual nodes and how tructures influence dynamical p cial actors in a social network? A pologies? sing those questions, the cours statistical modelling of complex al network analysis tasks. Topic sures, aggregate statistical chan olex networks, generating funct tamics in networks, spectral an onsists of annotated slides for l mplement and validate the theo owledge through weekly exerci exam.	cal infrastructures lik the World Wide Web ata that capture the i v can we discover sign process like diffusion And how can we analy se combines a series of anetworks with we s covered include four racteristics of large ne ion analysis of expec alysis, as well as the ectures as well as the ectures as well as the pretical concepts covers se sheets. The succe	e communication or b, but also for various nteraction topology nificant patterns in th or the spreading of e yze time series data of lectures which in ekly exercises that sh undations of graph th etworks, random gra ted graph properties modelling of time-va accompanying git-Re ered in the lectures. ssful completion of t	transportation networks, for in- s social, economic and biologi- of such complex systems? What ne structure of networks? How do epidemics? Which are the most on systems with dynamic net- ntroduce fundamental concepts now how we can apply them to neory, centrality and modulari- phs and statistical ensembles , scale-free networks, stocha- arying networks. The course ma- pository of jupyter notebooks, Students can test and deepen he course requires to pass a final
	Intende	d learning outcomes			
	The cou ven moo titativel terns. P very larg derstan distribu dom pro	rse will equip participants with delling of complex technical, so y model the topology of networ articipants will learn how to us ge networks that are generated ding of how the structure of ne tions influence the robustness ocesses.	a statistical network a bocial, and biological s rked systems and how e analytical methods based on different st tworks shapes dynan of systems, and how	nalysis techniques t systems. Students wi wwe can detect and to make statements tochastic models. Th nical processes, how emergent network for	hat are needed for the data-dri- ill understand how we can quan- characterize topological pat- about the expected properties of ey further gain an analytical un- statistical fluctuations in degree eatures emerge from simple ran-
	Courses	s (type, number of weekly conta	act hours, language –	- if other than Germa	n)
	V (2) + İ Module	لَّ (2) taught in: English			
	Method ster, inf	l of assessment (type, scope, la Formation on whether module c	anguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
	written If annou examina prox. 15 Languag credital	examination (approx. 60 to 120 unced by the lecturer at the beg ation of one candidate each (a minutes per candidate). ge of assessment: English ole for bonus	o minutes) ginning of the course, oprox. 20 minutes) or	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
	Allocati	ion of places			

Additional information

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,IT,SE,KI,HCI,IN

Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Information Systems (2019)
Master's degree (1 major) Information Systems (2022)
Master's degree (1 major) Computer Science (2023)
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)
Master's degree (1 major) Artificial Intelligence (2024)
Master's degree (1 major) Computational Mathematics (2024)
Master's degree (1 major) Mathematics (2024)
Master's degree (1 major) Information Systems (2024)
Master's degree (1 major) Information Systems (2025)
Master's degree (1 major) Computer Science (2025)
Master's degree (1 major) Mathematical Data Science (2025)
Master's degree (1 major) Aerospace Computer Science (2025)
First state examination for the teaching degree Gymnasium Computer Science (2025)

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Module title					Abbreviation			
Machi	ne Leari	ning for Networks 2			10-I=MLN2-232-mo	1		
Modul	e coord	inator		Module offered by				
holder	of the (Chair of Computer Scie	nce XV	Institute of Comput	er Science			
ECTS	Metho	od of grading	Only after succ. con	cc. compl. of module(s)				
5 numerical grade								
Duratio	on	Module level	Other prerequisites	i				
1 seme	ester	graduate						
Graph chine l dules i addres cal lea similar use ma tain a n ning te Addres statisti we can and a s Intend The co on con to infe on and learn lo	Contents Graph representations of relational data have become an important foundation to address data science and machine learning tasks across the sciences. Graph mining and learning techniques help us to detect functional modules in biological networks and communities in social networks, to find missing links in social networks, or to address node-, link-, or graph-level classification tasks. But how can we apply frequentist and Bayesian statistical learning techniques to data on complex networks? And how we can use the topology of relationships to infer similarity scores between objects that can, e.g., be used for the design of recommender systems? How can we use matrix factorization techniques to generate low-dimensional vector-space representations of nodes that retain a maximum amount of information about the topology of links? And how can we apply the latest deep learning techniques to address node-, link-, or graph-level learning tasks in data with relation structures? Addressing these questions, this course combines a series of lectures - which introduce theoretical concepts in statistical learning, representation learning, and graph neural networks with practice sessions that show how we can apply them in practical graph learning tasks. The course material consists of annotated slides for lectures and a series of accompanying jupyter notebooks. Intended learning outcomes The course will equip students with techniques to address supervised and unsupervised learning tasks in data on complex networks. Students will learn how statistical learning and data compression techniques can be used to infer cluster pattern and how topological similarity scores can be used to address unsupervised link prediction and graph reconstruction. Participants will further study both algebraic and deep learning based methods to							
dents o course	can app require	ly and deepen their kn es to pass a final writte	owledge through week n exam.	ly exercise sheets. T	he successful compl	etion of the		
Course	es (type	, number of weekly cor	ntact hours, language –	- if other than Germa	ın)			
V (2) + Modul	Ü (2) e taugh	t in: English						
Metho ster, in	d of ass Iformati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-		
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: English creditable for bonus								
Allocation of places								
Additional information								
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,IT,SE,KI,HCI,IN								
Worklo	ad							
150 h								
LA Gymnas	sien Compi	uter Science (2025)	JMU Würzburş data record I	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 64 / 171		

Teaching cycle

Teaching cycle: if announced

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

§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Computer Science (2023)

Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)

Master's degree (1 major) Artificial Intelligence (2024)

Master's degree (1 major) Computational Mathematics (2024)

Master's degree (1 major) Mathematics (2024)

Master's degree (1 major) Computer Science (2025)

Master's degree (1 major) Mathematical Data Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module title				Abbreviation		
Multili	ngual N	LP			10-I=MNLP-232-mo	1
Module	e coord	inator		Module offered by		
holder of the Chair of Computer Science			nce XII	e XII Institute of Computer Science		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Langua of-spee on spa ge Moc transla transfe pics: cu tual pa Intendo	Languages of the world: language families, typology, etymology. Linguistic universals: words, morphology, parts- of-speech, syntax. Alphabets (scripts), encoding, and language identification. Multilingual word representati- on spaces (aka cross-lingual word embeddings). Transformer architecture and Pretrained (multilingual) Langua- ge Models. Machine translation. Multilingual resources: unlabeled corpora, lexico-semantic networks and word translations, parallel corpora. Cross-lingual transfer: from word alignment and label projection, over MT-based transfer to zero-shot and few-shot transfer with multilingual Transformer-based language models. Advanced to- pics: curse of multilinguality, modularization and language adaptation, multilingual sentence encoders, contex- tual parameter generation, multi-source transfer, gradient manipulations.					
Studen and als from di transfe solve p to obta	ts will a so get a fferent r for va ractica in best	acquire theoretical and n insight into cutting ed languages in shared re rious NLP tasks. Upon s l NLP problems regardle performance for any co	practical knowledge o dge research in (multili presentation spaces th successful completion ess of the language of oncrete target language	n modern multilingu ingual) NLP. They wil nat enable semantic of the course, the st the text data, and to e.	al natural language l learn how to repres comparison and cro udents will be well-e determine the optim	processing sent texts ss-lingual equipped to nal strategy
Course	s (type,	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) + Module	Ü (2) e taugh	t in: German and/or Eng	glish			
Metho ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written lf anno examir prox. 1 Langua credita	examir unced l nation o 5 minut nge of a ble for	nation (approx. 60 to 12 by the lecturer at the be f one candidate each (a es per candidate). ssessment: German an bonus	eo minutes) eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examination	tion may be replaced in groups of 2 cand	d by an oral idates (ap-
Allocat	ion of p	olaces				
Additio	onal info	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Teaching cycle: every year, summer semester						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 3 b)						
Module appears in						
Master Master	's degre 's degre	ee (1 major) Informatior ee (1 major) Informatior	n Systems (2019) n Systems (2022)			
LA Gymnas	ien Compu	uter Science (2025)	JMU Würzburg data record I	g • generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. k - 2025	page 66 / 171

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Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Artificial Intelligence (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Management (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Information Systems (2024) Master's degree (1 major) Economathematics (2024) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Management (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Mathematical Data Science (2025) Master's degree (1 major) Economathematics (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module title			Abbreviation		
Sustain	Sustainable Mobility				10-I=NAMO-232-m01
Module	e coord	inator		Module offered by	
holder	of the C	Chair of Computer Science	e III	Institute of Compute	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	numei	rical grade			
Duratio	on	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Intende	ed learr	ning outcomes			
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + l	Ü (2)				
Method ster, inf	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina [.] a bonus)	tion offered — if not every seme-
written If annou examin prox. 15 credital	examir unced l ation o 5 minut ble for	nation (approx. 90 to 120 by the lecturer at the beg f one candidate each (ap es per candidate). bonus	minutes) inning of the course, prox. 20 minutes) or	the written examinat an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Focuses	s availa	able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): IN
Worklo	ad		· -	· · · · · ·	
150 h					
Teachir	ng cycle	9			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22 Nr. 3 b)					
Module appears in					
Master' Master' First sta	's degre 's degre ate exa	ee (1 major) Computer Sc ee (1 major) Computer Sc mination for the teaching	ience (2023) ience (2025) degree Gymnasium	Computer Science (2	2025)

Module title				Abbreviation		
Machi	ne Lear	ning for Natural Langu	age Processing		10-I=NLP-212-m01	
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scie	nce X	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
5 numerical grade						
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
The lec ents st ground almost beddir ke CNN trainin applica	The lecture conveys advanced knowledge about methods in computational text processing. To this end, it pres- ents state of the art models and techniques in the area of machine learning, as well as their technical back- ground, and their respective applications in Natural Language Processing. As one important building block of almost all modern NLP-models, different techniques for learning representations of words, so called Word Em- beddings, are presented. Starting from this we cover, among others, models from the area of Deep Learning, li- ke CNNs, RNNs and Sequence-to-Sequence architectures. The theoretical foundations of these models, like their training with Backpropagation, are also covered in depth. For all models presented in the lecture, we show their application to problems like sentiment analysis, text generation and machine translation in practice.					
Intend	ed lear	ning outcomes				
The pa and ar	rticipar e able t	its have solid knowled o identify and apply su	ge on problems and me itable methods for a sp	ethods in the area of pecific task.	computational text	processing
Course	es (type	, number of weekly cor	ntact hours, language –	- if other than Germa	ın)	
V (2) +	Ü (2)					
Metho ster, in	d of ass formati	e ssment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	ition offered — if not	every seme-
lf anno examin prox. 1 Langua credita	n examined ounced nation c 5 minut age of a able for	by the lecturer at the b fone candidate each (es per candidate). ssessment: German ar bonus	eginning of the course, approx. 20 minutes) or nd/or English	the written examina an oral examinatior	tion may be replaced in groups of 2 cand	d by an oral idates (ap-
Alloca	tion of p	olaces				
Additio	onal inf	ormation				
Focuse AT,KI,F	es availa ICI	able for students of the	Master's programme I	nformatik (Compute	r Science, 120 ECTS (credits):
Worklo	oad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination re	gulations for teaching-	degree programmes)	I	
§ 22 Nr. 3 b)						
Module appears in						
Module studies (Master) Computer Science (2019)						
Master's degree (1 major) Computer Science (2021)						
Master's degree (1 major) Computational Mathematics (2022)						
Master's degree (1 major) Information Systems (2022)						
Master	r's degr	ee (1 major) Mathemat	ics (2022)			
Master	r's degr	ee (1 major) Computer	Science (2023)			
LA Gymnas	sieri Compi	ater Science (2025)	data record	s • generated 18-jun-2025 • 6 Lehramt Gymnasien Informat	ik - 2025	page 69 / 171

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Master's degree (1 major) Computational Mathematics (2024)

Master's degree (1 major) Management (2024)

Master's degree (1 major) Mathematics (2024)

Master's degree (1 major) Information Systems (2024)

Master's degree (1 major) Economathematics (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Information Systems (2025)

Master's degree (1 major) Management (2025)

Master's degree (1 major) Computer Science (2025)

Master's degree (1 major) Mathematical Data Science (2025)

Master's degree (1 major) Economathematics (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	
	data record Lehramt Gymnasien Informatik - 2025	

Module title			Abbreviation			
Operations Research 10-I=OR-232-mo1						
Module coordinator		Module offered by				
holder of the Chair of Computer Science L		ce l	Institute of Computer Science			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Contents						
Production plans, railway timetables, the assignment of radio frequencies, planning of delivery tours, or the con- struction of an 'optimal' university timetable: these problems – and many more – can be modeled as (mixed-) in- teger linear optimization problems and solved with integer programming methods. This course teaches integer programming methods like branch-and-bound, cutting plane, and decomposition methods. Furthermore, we practice our modeling skills by studying a variety of application examples.						
Intend	ed learı	ning outcomes				
 After completing the course The students are able to model optimization problems as mathematical program (in particular: mixed-in-teger linear programs). The students are able to apply integer programming methods and understand how and why these work. 						
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	ın)	
V (2) + Ü (2) Madula taught in: Cormon and /ar English						
Motho		concernant (type, scope	anguaga if other th	an Corman, ovamina	tion offered if not	avani como
ster, in	iformati	on on whether module	can be chosen to earn	a bonus)	llion onered — ii not	every seme-
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocation of places						
Additional information						
Focuse	es availa	able for students of the		nformatik (Computer	r Science, 120 ECTS o	credits): IN
Worklo	ad					
150 h						
Teachi	ng cycl	٩				
	ing cycl	6				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 3 b)						
Module appears in						
Master's degree (1 major) Information Systems (2019)						
Master's degree (1 major) Information Systems (2022)						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Computational Mathematics (2024)						
Master's degree (1 major) Management (2024)						
Master's degree (1 major) Mathematics (2024)						
Master's degree (1 major) Information Systems (2024)						
LA Gymnas	sien Compu	uter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 71 / 171

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Master's degree (1 major) Economathematics (2024) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Management (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Economathematics (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.					
	data record Lehramt Gymnasien Informatik - 2025					
Modul	Module title Abbreviation					
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Professional Project Management 10-I=PM-252-m01						
Modul	e coordi	nator		Module offered by	•	
holder	of the C	hair of Computer Scie	nce III	Institute of Comput	er Science	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5 numerical grade						
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate	We recommend con	npleting module 10-1	=PRJAK in parallel.	
Conter	nts					
Project goals, project assignment, project success criteria, business plan, environment analysis and stakeholder management, initialisation, definition, planning, execution/control, finishing of projects, reporting, project communication and marketing, project organisation, team building and development, opportunity and risk management; conflict and crisis management, change and claim management; contract and procurement management, quality management, work techniques, methods and tools; leadership and social skills in project management, program management, multiproject management, project portfolio management, PMOs; peculiarities of software projects; agile project management/SCRUM, combination of classic and agile methods.						
Intend	ed learn	ing outcomes				
The students possess practically relevant knowledge about the topics of production management and/or pro- fessional project management. They are familiar with the critical success criteria and are able to initiate, define, plan, control and review projects.						
Course	Courses (type, number of weekly contact hours, language — if other than German)					
V (4)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)						
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocat	tion of p	laces				
Additio	onal info	rmation				
Focuse IT, KI, E	es availa ES, LR, H	ble for students of the CI, GE, IN	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits): SE,
Worklo	bad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 3 b)						
Module appears in						
Supplementary course Supplementary course Entrepreneurship into Action (ZENTRIA) (2025) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Management (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Economathematics (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)						
LA Gymnas	sien Compu	ter Science (2025)	JMU Würzburg data record I	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 73 / 171
						1

Module title Abbreviation					
Quanti	Quantum Communications 10-l=QC-261-m01				
Module coordinator			Module offered by		
holder	of the Chair of Computer Scienc	e VII	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
5	numerical grade				
Duratio	on Module level	Other prerequisites			
1 seme	ester graduate				
Contents • Introduction • Hilbert Spaces and Operators • Quantum Mechanics • Quantum Mechanics • Quantum States • Quantum Circuit Elements • Entanglement and Its Applications • Quantum Key Distribution • Quantum Channel • Quantum Error Correction Coding • Continuous-Variable Quantum Communications • Further Topics Intended learning outcomes Students will • develop a solid foundation in quantum information technology, including qubits, quantum gates, entanglement, and quantum measurements, • learn about secure communications using quantum mechanics, including protocols like Quantum Key Distribution (QKD), • gain familiarity with protocols such as quantum teleportation, superdense coding and error correction, and • understand the effects of noise and decoherence in quantum communications and learn strategies to					
Course	s (type, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (2) + Module	Ü (2) e taught in: German and/or Engl	ish			
Metho ster, in	d of assessment (type, scope, la formation on whether module c	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If anno examir prox. 1 Langua credita	written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus				
Allocation of places					
Additional information					
Focuse	Focuses available for students of the Master's programme Informatik (Computer Science, 120 FCTS credits): I R				
Worklo	bad			,	
150 h					
Teachi	ng cycle				

A Gymnasien Computer Science (2025)

17

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

§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Aerospace Computer Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

LA Gymnasien Computer Science (2025)

Module title Abbreviation					
Reinfor	rcemen	t Learning and Computat	ional Decision Makir	ıg	10-I=RLCDM-252-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
This course will provide the essential notions about reinforcement learning and further related approaches for computational decision-making (e.g., multi-armed bandits, recommender systems). The topics will be covered under a both theoretical and empirical lens, providing the rigorous mathematical foundations of reinforcement learning and decision-making, complementing them with concrete examples of real-world applications.					
Intende	ed lear	ning outcomes			
The students will gain fundamental knowledge of Reinforcement Learning spanning from classical methods to modern algorithms based on deep learning techniques, and Decision-Making approaches such as multi-armed bandits and recommender systems. Students will know about the theoretical treatment of the methods explained in the course, and will have a deep understanding of the importance of Reinforcement Learning and Decision-Making in solving real-world problems. They will be able to design, implement, and conduct Reinforcement Learning experiments for solving problems from simulated basic tasks to advanced real-world applications, e.g., games autonomous driving finance robotics.					
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	n)
V (2) +	Ü (2)				
Module	e taugh	t in: German and/or Engli	ish		
Method ster, in	d of ass formati	s essment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonuc					
Allocat	ion of j	places			
Additio	nal inf	ormation			
Focuse	s availa	able for students of the M	laster's programme l	nformatik (Computer	r Science, 120 ECTS credits): IN
Worklo	ad		·	·	
150 h					
Teaching cvcle					
Teaching cycle: every year, summer semester					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22	§ 22 Nr. 3 b)				
Module	appea	ars in			
Master	's degr	ee (1 major) Computer Sc	ience (2025)		
Master	's degr	ee (1 major) Mathematica	ll Data Science (2025)	
First sta	ate exa	mination for the teaching	degree Gymnasium	Computer Science (2	2025)

JMU Würzburg • generated 18-Jun-2025 • exam. reg. data record Lehramt Gymnasien Informatik - 2025

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Module	Module title Abbreviation					
Remote	Remote Sensing 10-I=RRS-232-m01					
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scien	ce VIII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade		•		
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts		-			
Remote sensing refers to the use of satellite- or aircraft-based sensor technologies to detect and classify objects on Earth, including on the surface and in the atmosphere and oceans, based on propagated signals (e.g. electro- magnetic radiation). It may be split into "active" remote sensing (i.e., when a signal is emitted by a satellite or aircraft and its reflection by the object is detected by the sensor) and "passive" remote sensing (i.e., when the re- flection of sunlight is detected by the sensor).						
Intend	ed learı	ning outcomes				
The stu sphere mote s	The students learn the basics of earth observation. They outline and explain the radiation path through the atmo- sphere to the object under investigation and back to the sensor. They emphasize essential characteristics of re- mote sensing data, sensors and platforms.					
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)	tin. Cormon and lor End	dich			
Module taught in: German and/or English						
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)						
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English						
Allocat						
Allocal		laces				
Additio	nal info	ormation				
possib	le majo	rs for MA 120 Computer	Science: LR,IN			
Worklo	ad					
150 h						
Teaching cycle						
Teaching cycle: every year, summer semester						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)						
Master's degree (1 major) Artificial Intelligence (2024)						
Master's degree (1 major) Computational Mathematics (2024)						
Master's degree (1 major) Mathematics (2024)						
Master's degree (1 major) Computer Science (2025)						
Master	's degr	ee (1 major) Aerospace	Computer Science (20	25)	``	
First st	ate exa	mination for the teachir	ig degree Gymnasium	Computer Science (2	2025)	nage 77 / 171
LA Gymnas	ien compl	ater Science (2025)	data record	Lehramt Gymnasien Informati	k - 2025	page // / 1/1

Module title Abbreviation						
Software Architecture 10-I=SAR-161-m01						
Module	e coord	nator		Module offered by		
holder	of the (hair of Computer Scien	ce ll	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		_			
Introduction to software architecture, architectural styles and patterns, software metrics, evaluation of architec- tural styles, software components, interface models and design guidelines, design-by-contract, component-ba- sed software engineering, service-oriented architectures, microservice architectures, scalability of databases, cloud-native and serverless computing, continuous integration, continuous delivery, continuous deployment, model-driven architecture						
Intende	ed learr	ning outcomes				
The students possess a fundamental and applicable knowledge about advanced topics in software engineering with a focus on modern software architectures and fundamental approaches to model-driven software engineering.						
Course	s (type,	number of weekly cont	act hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocat	ion of r	laces				
Additio	nal info	ormation				
Focuse SE,IT,E	s availa S	ble for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 3 b)						
Module appears in						
Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's degree (1 major) Computer Science (2017)						
Master	Master's degree (1 major) Computer Science (2018)					
Module	e studie	s (Master) Computer Sc	ience (2019)			
LA Gymnas	ien Compi	iter Science (2025)	JMU Würzburg data record I	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 78 / 171

Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Information Systems (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Management (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Information Systems (2024) Master's degree (1 major) Economathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Management (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Economathematics (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

UNIVERSITÄT

WÜRZBURG

Systems Benchmarking 10-I=SB-252-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 Contents Eenchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important loe as evaluation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundation so of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approaches metrics, workloads, and measurement methodology. More specifically the following topics are covered: benchmarking basics, metrics, statistical measurements, experimental design, workloads, measurement tools, operational analysis, basic queueing models, and benchmarks tandardization. Furthermore, the course covers selective application areas and case studies, such as benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security intended learning outcomes Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of exi					
Module cordinator Module offered by holder of the Unit of Computer Science II Institute of Computer Science ECTS Meth-of grading Only after succ. compl. of module(s) 5 num=rical grade Duratior Module level Other prerequisites 1 semester graduate Conterts Benchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as evaluation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundation of new approaches and methodologies. The course introduces the foundation analysis, basic queueing models, and benchmark standardization. Furthermore, the course covers selected application areas and case studies, such as benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security for (2) + 0 (2) Method of assessment (type, scope, language — if other than German, examination of ner explander depression of ner approaches and benchmark ing approaches and benchmark results. Course: (type, number of weekly contact hours, language — if other than German) V (2) + 0 (2) Method of assessment (type, scope, language — if other than German, examination of ner candidate eah (appr					
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 - Contents Benchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as evaluation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundations of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approaches and methodologies. Such as benchmark standardization. Furthermore, the course coveres electional analysis, basic queueing models, and benchmark standardization. Furthermore, the course covers selectional analysis, basic queueing models, and benchmarks, metrics, and measurement tools. operational analysis, basic queuing models, and benchmarks, metrics, and measurement tools. Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of existing benchmarking approaches and benchmark results. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Ú (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to ean a bonus)					
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Benchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as evaluation tools during system design, development, and maintennace. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundations of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approaches and benchmarks tandardization. Furthermore, the course covers selection anakysis, basic queueing models, such as benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security Intended learming outcomes Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of existing benchmarking approaches and benchmark results. Courses (type, number of weekly contact hours, language — if other than German) V (2) + 0 (2) Method of assessment (type, scope, language — if other than German, examination offreed — if not every semester, information on whether module can be chosen to earn a bonus) written examination of one candidate each (approx. 20 minutes) or an oral examinat					
5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents					
Duration Module level Other prerequisites 1 semester graduate Contents					
1 semester graduate Contents Eenchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as evaluation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundations of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approaches metrics, workloads, and measurement methodology. More specifically the following topics are covered: benchmarking basics, metrics, statistical measurements, experimental design, workloads, measurement tools, operational analysis, basic quueing models, and benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security Intended learning outcomes Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of existing benchmarking approaches and benchmark results. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Û (2) 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. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examina					
Contents Benchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as evaluation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundati ons of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approach: metrics, workloads, and measurement methodology. More specifically the following topics are covered: benchmarking basics, metrics, statistical measurements, experimental design, workloads, measurement tools, operational analysis, basic queueing models, and benchmark standardization. Furthermore, the course covers selected application areas and case studies, such as benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security Intended learning outcomes Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of existing benchmarking approaches and benchmark results. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Û (2) 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. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minute					
Benchmarking has become a major discipline in science and technology as a driver of product quality, efficiency and sustainability. Reliable and fair benchmarks enable educated decisions and play an important role as eva- luation tools during system design, development, and maintenance. In research, benchmarks play an integral part in the evaluation and validation of new approaches and methodologies. The course introduces the foundati ons of benchmarking as a discipline, covering the three fundamental elements of each benchmarking approach: metrics, workloads, and measurement methodology. More specifically the following topics are covered: bench- marking basics, metrics, statistical measurements, experimental design, workloads, measurement tools, opera- tional analysis, basic queueing models, and benchmark standardization. Furthermore, the course covers selec- ted application areas and case studies, such as benchmarking of energy efficiency, virtualization, storage, micro services, cloud elasticity, performance isolation, resource demand estimation, and software and system security Intended learning outcomes Students are able to design and build fair and reliable benchmarks, metrics, and measurement tools. Students can evaluate the quality of existing benchmarking approaches and benchmark results. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Ü (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 6o to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students					
Language of assessment: German and/or English creditable for bonus Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IT, ES, HCI, GE, IN Workload					
Allocation of places Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IT, ES, HCI, GE, IN Workload					
 Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IT, ES, HCI, GE, IN Workload					
Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IT, ES, HCI, GE, IN Workload					
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IT, ES, HCI, GE, IN Workload					
Workload					
150 h					
Teaching cycle					
Teaching cycle: every year, summer semester					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 Nr. 3 b)					
Module appears in					
Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)					
LA Gymnasien Computer Science (2025) JMU Würzburg • generated 18-Jun-2025 • exam. reg. page 80 / 171 data record Lehramt Gymnasien Informatik - 2025					

Module title Abbreviation						
Introdu	Introduction to IT Security 10-I=SEC-252-mo1					
Module	e coordi	nator		Module offered by		
holder	of the C	hair of Computer Scier	ice II	Institute of Comput	er Science	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5	numer	ical grade				
Duratio	on .	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
 The course provides a broad sweep through concepts and technologies related to IT security: Theoretical aspects: information-theoretic security, computational security, introduction to cryptography (historical and modern ciphers, hash functions, pseudo-random generators, message authentication co-des, public key cryptography) Network security: protocol security, security of TCP/IP, public key infrastructure, user authentication Software security: Software vulnerabilities, common programming errors and exploitation techniques, reverse engineering and obfuscation, malware and anti-malware Platform security: access control models, security policies, operating system security, virtualization, se- 						
Intend	ed learr	ing outcomes				
Students will be introduced to the main concepts and abstractions of IT security. They learn how to model threats and analyze security of a system critically from the attacker view point. After visiting the lecture students are going to understand the purpose and function of several security technologies, as well as their limitations. The exercises provide some hands-on experience of security flows in software.						
Courses (type, number of weekly contact hours, language — if other than German)						
V (2) +	Ü (2)	· · · ·				
Module	e taught	in: English				
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)						
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: English creditable for bonus						
Allocat	ion of p	laces				
Additional information						
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SEC, IN						
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Master First sta	's degre ate exa	ee (1 major) Computer S mination for the teachi	Science (2025) ng degree Gymnasium	Computer Science (2	2025)	
LA Gymnas	ien Compu	ter Science (2025)	JMU Würzburg data record I	g ● generated 18-Jun-2025 ● e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 81 / 171

Module	e title				Abbreviation
Securit	y of So	ftware Systems			10-l=SSS-232-m01
Module	e coord	inator		Module offered by	
holder	of the C	Chair of Computer Science	e ll	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	numerical grade				
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Contents The lecture provides an overview of common software vulnerabilities, state-of-the-art attack techniques on modern computer systems, as well as the measures implemented to protect against these attacks. In the course, the following topics are discussed: x86-64 instruction set architecture and assembly language Runtime attacks (code injection, code reuse, defenses) Web security Blockchains and smart contracts Side-channel attacks Hardware security Intended learning outcomes Students gain a deep understanding of software security, from hardware and low-level attacks to modern concepts such as blockchains. The lecture prepares for research in the area of security and privacy, while the exercises allow students to gain hands-on experience with attacks and analysis of systems from an attacker's perspective. Courses (type, number of weekly contact hours, language — if other than German) V (2) + Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes)					
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: English creditable for bonus					
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE,KI,LR, HCI, ES, SEC,IN					
Workload					
150 h					
Teachi	ng cycl	9			
Teaching cycle: every year, summer semester					
Referre	d to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
§ 22	Nr. 3 b)	、			
Module	appea	rs in			
Module	e studie	s (Master) Computer Scie	ence (2019)		
Master	's degre	ee (1 major) Computer Sc	ience (2023)		

LA Gymnasien Computer Science (2025)



Master's degree (1 major) Artificial Intelligence & Extended Reality (2024) Master's degree (1 major) Artificial Intelligence (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Information Systems (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Computer Science (2025)

Master's degree (1 major) Aerospace Computer Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 83 / 17
	data record Lehramt Gymnasien Informatik - 2025	

Modul	Module title Abbreviation					
Discrete Event Simulation 10-I=ST-232-m01						
Modul	e coord	inator		Module offered by		
holder of the Cheir of Computer Science				Institute of Comput	or Science	
	Mothe	d of grading		nnl of modulo(c)		
	nume	rical grade				
5	Inume					
1 seme	on oster	graduate	Uther prerequisites			
Conter	nts	Sidduite				
The simulation of communication systems is illustrated and practically performed on contemporary examples, e.g., popular Internet services or the Internet of Things (IoT). The following topics will be conveyed: Introduction to simulation techniques, discrete-event simulation and process-oriented simulation, generating random numbers and random variables, statistical analysis of simulation results, evaluation of measured data, designing and evaluating simulation experiments, special random processes, possibilities and limitations of mo- delling and simulation, advanced concepts and techniques, practical execution of simulation projects.						
Intend	ed lear	ning 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.						
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) + Ü (2)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)						
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Focuse	es availa 5,GE,IN	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS (credits):
Worklo	ad					
150 h						
Teaching cycle						
Teaching cycle: every year, summer semester						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Module studies (Master) Computer Science (2019)						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Aerospace Computer Science (2023)						
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)						
Master	Master's degree (1 major) Artificial Intelligence (2024)					
Master	's degr	ee (1 major) Computatio	onal Mathematics (202	24)		
Master	's degr	ee (1 major) Mathemati	cs (2024)			
LA Gymnas	sien Comp	uter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 84 / 171

Master's degree (1 major) Information Systems (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Information Systems (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025) JMU Würzburg • generated 18-Jun-2025 • exam. reg. page 85 / 171 data record Lehramt Gymnasien Informatik - 2025

Module title Abbreviation						
NLP an	d Text	Mining			10-I=STM-162-m01	
Module	e coord	inator		Module offered by		
holder of the Chair of Computer Science VI			e VI	Institute of Computer Science		
ECTS Method of grading Only after succ.			Only after succ. con	npl. of module(s)		
5 numerical grade						
Duratio	n l	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Founda tection stic par The stu text mi taught.	Foundations in the following areas: definition of NLP and text mining, properties of text, sentence boundary de- tection, tokenisation, collocation, N-gram models, morphology, hidden Markov models for tagging, probabili- stic 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.					
Intende	ed learr	ning outcomes				
The stu text mi class. 1	idents p ning an They ha	bossess theoretical and p d language processing. T ve gained experience in t	practical knowledge a They are able to solve the application of tex	about typical method e practical problems t mining algorithms.	ls and algorithms in with the methods ac	the area of quired in
Course	s (type,	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (2) + Ü (2)						
Methor ster, in	d of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate).						
Allocat	ion of r	olaces				
	· · · ·					
Additio	onal info	ormation				
Focuse IT, HCI.	s availa	able for students of the M	laster's programme l	nformatik (Computer	Science, 120 ECTS o	credits): AT,
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regu	lations for teaching-	legree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	urs in				
Master	's degre	ee (1 major) Computer Sc	ience (2016)			
Master	's degre	ee (1 major) Computer Sc	ience (2017)			
Master	's degre	ee (1 major) Computer Sc	ience (2018)			
Master	's degre	ee (1 major) Computation	al Mathematics (201	9)		
Master	's degre	ee (1 major) Mathematics	5 (2019)			
Master	's degre	ee (1 major) Information S	Systems (2019)			
Master	's teacł	ning degree Gymnasium I	MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	020)
Supple	mentar	y course MINT Teacher E	ducation PLUS, Elite	Network Bavaria (ENI	B) (2020)	
LA Gymnas	ien Compi	uter Science (2025)	JMU Würzburg data record I	s • generated 18-Jun-2025 • e. .ehramt Gymnasien Informati	xam. reg. k - 2025	page 86 / 171

Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's degree (1 major) Information Systems (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Mathematical Data Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 87 / 171
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Module title Abbreviation						
Telecommunication Systems 10-I=TSD-232-m01						
Module coordinator Module offered by						
Dean of Studies Informatik (Computer Science) Institute of Comput			er Science			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
 In S D B D D D D C N C N F Intende Studen g a le g p u ti b i 	 Introduction Signals and Linear Systems Digital Representation of Analog Signals Binary Baseband Modulation Detection of Binary Baseband Signals in Noise Digital Modulation Multicarrier Modulation Channel Coding Networks and Protocols Further Topics Intended learning outcomes Students will grasp the concepts and techniques of sampling, quantisation and pulse shaping for signal transmission and reception, learn how to detect and decode signals in the presence of noise, gain knowledge of higher order modulation schemes and their applications, including Quadrature Amplitude Modulation (QAM) and Frequency Shift Keying (FSK), understand the basics of error control coding, such as forward error correction (FEC) codes and convolutional codes, and their role in enhancing data reliability and become acquainted with network protocols, including the OSI model, TCP/IP protocols, and those used 					
Course	s (type.	number of weekly con	tact hours, language –	- if other than Germa	n)	
V(4) +	<u> </u> (2)					
Module	e taugh	t in: German and/or En	glish			
Method ster, in	d of ass formati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written If anno examin prox. 19 Langua credita	examin unced l ation o 5 minut ge of a ble for	nation (approx. 60 to 12 by the lecturer at the bo f one candidate each (es per candidate). ssessment: German an bonus	20 minutes) eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examination	tion may be replace in groups of 2 cand	d by an oral idates (ap-
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Focuse	s availa	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS (credits): LR
Worklo	Workload					
300 h						
Teachi		2				
reaciiii	is cycl					
L						
LA Gymnas	ien Compı	iter Science (2025)	JMU Würzburg data record I	g • generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. k - 2025	page 88 / 171

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

§ 22 II Nr. 3 b)

Module appears in

Master's degree (1 major) Computer Science (2023)

Master's degree (1 major) Aerospace Computer Science (2023)

Master's degree (1 major) Computer Science (2025)

Master's degree (1 major) Aerospace Computer Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Modul	e title			Abbreviation		
Visualization of Graphs 10-I=VG-161-m01						
Modul	e coordinator	Module offered by	<u>.</u>			
holder of the Chair of Computer Science I		Institute of Comput	er Science			
ECTS	Method of grading	Only after succ. con	npl. of module(s)			
5	numerical grade		,,, _,, _			
Duratio	on Module level	Other prerequisites	i			
1 seme	ester graduate					
Conter	nts					
This co phenth the pla as well	This course covers the most important algorithms to draw graphs. Methods from the course <i>Algorithmische Graphentheorie</i> (<i>Algorithmic Graph Theory</i>) 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.					
Intend	ed learning outcomes					
The pa their k	rticipants get an overview of g nowledge about the modelling	raph visualisation and g and solving of probler	become familiar wit ns with the help of g	h typical tools. They raphs and graph alg	consolidate orithms.	
Course	es (type, number of weekly cor	ntact hours, language –	- if other than Germa	in)		
$V(2) + \ddot{\parallel}(2)$						
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme-						
ster, information on whether module can be chosen to earn a bonus)						
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocat	tion of places					
Additio	onal information					
Focuse AT,IT,H	es available for students of the	Master's programme I	nformatik (Compute	r Science, 120 ECTS o	credits):	
Worklo	bad					
150 h						
Teachi	ng cvcle					
Roforra	ad to in IPO I (examination re	gulations for teaching.	degree programmes)			
8 22 11						
Modul	a appears in					
Mactor	e appears III	Science (2016)				
Master	r's degree (1 major) Computer	ics (2016)				
Master	Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Computational Mathematics (2016)					
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)					
Supple	ementary course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2016)		
Master	's degree (1 major) Computer	Science (2017)				
Master	Master's degree (1 major) Computer Science (2018)					
Master	Master's degree (1 major) Computational Mathematics (2019)					
Master	r s degree (1 major) Mathemat	105 (2019)				
LA Gymnas	sien Computer Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 90 / 171	

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Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Computer Science (2021)

Master's degree (1 major) Computational Mathematics (2022)

Master's degree (1 major) Mathematics (2022)

Master's degree (1 major) Computer Science (2023)

Master's degree (1 major) Computational Mathematics (2024)

Master's degree (1 major) Mathematics (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Computer Science (2025)

Master's degree (1 major) Mathematical Data Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 91 / 171
	data record Lehramt Gymnasien Informatik - 2025	

Module	e title				Abbreviation	
Virtual	Prototy	ping of Embedded Sys	stems		10-I=VPES-232-mo	1
Module coordinator			Module offered by			
Dean o	of Studie	es Informatik (Compute	er Science)	Institute of Comput	ter Science	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
5	Inumer	ical grade				
Duratio	on	Module level	Other prerequisites	i		
Conten	nts	glaudate				
Today's stems. and fas a thoro Intende Intende	s compa Therefo st desig ough de ntroduc System Hardwar Modellir Modellir Modellir Design s ed learr Jndersta Finding f Develop	anies have to deal with ore, new development n on electronic system sign space exploration tion to virtual prototyp models and specification e/Software co-develop ng with cycle accurate of on higher level of at ng of embedded procest space exploration for e ing outcomes anding advantages of the right level of abstra- a feeling for the trade ware/Software co-develop	complex hardware ard tools and approaches a level. In our research, on software and hardw ing and virtual product on oment with virtual product SystemC ostraction with Transac sors with gem5 mbedded systems with novel virtual product de totion for a specific pro off between accuracy a elopment	chitectures such as h such as virtual protor we use SystemC and ware level. development metho otyping tion Level Modeling virtual prototypes evelopment blem nd simulation speed	eterogeneous multi typing are needed fo d gem5 based virtua odology for embedde (TLM)	-core sy- or efficient l platforms for ed systems
<u>o</u>	Desig	gn space exploration	tact hours language	if other than Corma	20	
V (a)	ii (a)	number of weekly Cor	act nours, language –	- ii other than Germa	111 <i>)</i>	
Module	e taughi	t in: German and/or En	glish			
Metho ster, in	d of ass Iformati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	ition offered — if not	every seme-
written If anno examir prox. 1 Langua credita	examir ounced l nation o 5 minut age of a oble for	nation (approx. 60 to 1 by the lecturer at the b f one candidate each (es per candidate). ssessment: German ar bonus	20 minutes). eginning of the course, approx. 20 minutes) of Id/or English	the written examina r an oral examinatior	tion may be replace 1 in groups of 2 canc	d by an oral lidates (ap-
Allocat	tion of p	laces				
Additio	onal info	ormation				
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): ES						
Worklo	oad					
150 h			_			
Teachi	ng cycl	9				
Referre	ed to in	LPOI (examination re	gulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
LA Gymnas	sien Compu	iter Science (2025)	JMU Würzbur data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informat	exam. reg. ik - 2025	page 92 / 171
					-	

Module appears in

Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 93 / 171
	data record Lehramt Gymnasien Informatik - 2025	

Module title Abbreviation				Abbreviation	
3D Poi	nt Clou	d Processing			10-l-3D-152-m01
Module coordinator				Module offered by	
holder	holder of the Chair of Computer Science XVII		e XVII	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts				
Laser s d trees mappi	scannin; s, registi ng.	g, Kinect and camera mo ration, features, segment	dels, basic data struc ation, tracking, appli	ctures (lists, arrays, c cations for airborne	oc-trees), calculating normals, k- mapping, applications to mobile
Intend	ed learı	ning outcomes			
Studer munica data p require	nts unde ate with rocessin ements,	erstand the fundamental engineers / surveyors / ng and have experienced in terms of memory requ	principles of all aspe CV people / etc. Stud that real application irements and in term	ects of 3D point cloud lents are able to solv scenarios are challe is of implementation	d processing and are able to com- ve problems of modern sensor enging in terms of computational issues.
Courses (type, number of weekly contact hours, language — if other than German)					
V (2) +	Ü (2)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					
If anno examir prox. 1 Langua credita	If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus				
Alloca	tion of p	olaces			
Additio	onal info	ormation			
Worklo	bad				
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
§ 22	Nr. 3 b)				
Modul	e appea	irs in			
Bachel Bachel Bachel First st Master Supple Bachel Bachel	lor's des lor's des lor's des lor's des ate exa r's teach ementar lor's des lor's des	gree (1 major) Computer 9 gree (1 major) Mathemati gree (1 major) Computatio gree (1 major) Aerospace mination for the teaching ning degree Gymnasium I y course MINT Teacher Eo gree (1 major) Aerospace gree (1 major) Computer 9	Science (2015) cs (2015) onal Mathematics (20 Computer Science (2 degree Gymnasium WINT Teacher Educat ducation PLUS, Elite I Computer Science (2 Science (2017)	015) 2015) Computer Science (2 ion PLUS, Elite Netwo Network Bavaria (EN 2017)	2015) ork Bavaria (ENB) (2016) B) (2016)
			18411 1872		

UNIVERSITÄT WÜRZBURG

Bachelor's degree (1 major) Computer Science (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 95 / 171
	data record Lehramt Gymnasien Informatik - 2025	

Module title Abbreviation					
Algorit	Algorithms and data structures 10-I-ADS-152-m01				
Module coordinator Module offe			Module offered by	ered by	
Dean c	of Studies Informatik (Compute	er Science)	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
10	numerical grade				
Durati	on Module level	Other prerequisites	i		
1 seme	ester undergraduate				
Conter	nts				
Design ta type	and analysis of algorithms, respectively, lists, trees, graphs, basic g	ecursion vs. iteration, s raph algorithms, progra	ort and search methe amming in Java.	ods, data structures,	abstract da-
Intend	ed learning outcomes				
Studer know t are abl	nts are proficient in independe he basic paradigms for the de le to estimate the runtime beh	ntly designing, precise sign of algorithms and avior of algorithms and	ly describing and an can implement them I prove the correctne	alyzing algorithms. T i in practical progran ss of algorithms.	The students ns. Students
Course	es (type, number of weekly cor	ntact hours, language –	- if other than Germa	n)	
V (4) +	Ü (2)				
Metho ster, in	d of assessment (type, scope, formation on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). creditable for bonus					
Allocat	tion of places				
Additio	onal information				
Worklo	bad				
300 h					
Teachi	ng cvcle				
Teachi	ng cycle: only in winter semes	ter			
Referre	ed to in IPOI (examination re	gulations for teaching.	degree programmes)		
§ 49	Vr. 1 a)				
Modul	e annears in				
Bachel	lor's degree (1 major) Compute	er Science (2015)			
Bachel	lor's degree (1 major) Compute lor's degree (1 major) Mathem	atics (2015)			
Bachel	lor's degree (1 major) Hattien	athematics (2015)			
Bachel	Bachelor's degree (1 major) Human-Computer Systems (2015)				
Bachel	Bachelor's degree (1 major) Computational Mathematics (2015)				
Bachel	lor's degree (1 major) Aerospa	ce Computer Science (2	2015)		
First st	ate examination for the teachi	ng degree Realschule (Computer Science (2	015)	
First st	ate examination for the teachi	ng degree Gymnasium	Computer Science (2	2015)	
Bachel	lor's degree (1 major) Aerospa	ce Computer Science (2	2017)		
Bachel	lor's degree (1 major) Compute	er Science (2017)			
Dachei	tor s degree (1 major) compute	er Science (2019)			
LA Gymnas	sien Computer Science (2025)	JMU Würzburş data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 96 / 171

Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation				
Algorithmic Graph Theory 10-I-AGT-152-m01							
Module	coord	inator		Module offered by			
holder of the Chair of Computer Science I			nce l	Institute of Computer Science			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)				
5 numerical grade							
Duratio	n	Module level	Other prerequisites	6			
1 seme	ster	undergraduate					
Conten	ts						
We disc colourin of grap prograr	cuss tyj ngs, wo h probl ns or h	bical graph problems: ork with planar graphs ems, we also become ow we show that they a	We solve round trip pro and find out how the ra familiar with new conc are fixed parameter col	oblems, calculate ma anking algorithm of G epts, for example ho mputable.	ximal flows, find ma loogle works. Using w we model problem	tchings and the examples is as linear	
Intende	ed learr	ning outcomes					
The stu cipants course,	dents a are ab studer	are able to model typic le to decide which too nts learn in detail how	al problems in comput l from the course helps to estimate the run tim	er science as graph p s solve a given graph e of given graph algo	problems. In addition problem algorithmic prithms.	n, the parti- cally. In this	
Course	s (type,	number of weekly cor	itact hours, language –	– if other than Germa	ın)		
V (2) +	Ü (2)						
Method	l of ass formati	essment (type, scope,	language — if other th	an German, examina	tion offered — if not	every seme-	
written If annou examin prox. 15	examinunced l extion o for minut	nation (approx. 60 to 1 by the lecturer at the b f one candidate each (es per candidate).	20 minutes). eginning of the course, approx. 20 minutes) o	, the written examina r an oral examination	tion may be replace in groups of 2 cand	d by an oral idates (ap-	
Langua credita	ge of a ble for	ssessment: German ar bonus	nd/or English				
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teachir	ng cycl	e					
Referre	d to in	LPOI (examination re	gulations for teaching-	degree programmes)			
§ 22	Nr. 3 b)						
Module appears in							
Bachelor's degree (1 major) Computer Science (2015)							
Bachelor's degree (1 major) Mathematics (2015)							
Bachelor's degree (1 major) Computational Mathematics (2015)							
Bachelor's degree (1 major) Aerospace Computer Science (2015)							
First state examination for the teaching degree Gymnasium Computer Science (2015)							
Supplementary course MINT Teacher Education PLUS. Elite Network Bavaria (FNB) (2016)							
Bachel	Bachelor's degree (1 major) Aerospace Computer Science (2017)						
Bachelo	or's de	gree (1 major) Compute	er Science (2017)	-			
LA Gymnasi	ien Compı	iter Science (2025)	JMU Würzbur	g • generated 18-Jun-2025 • e	xam. reg.	page 98 / 171	

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Bachelor's degree (1 major) Computer Science (2019) Module studies (Bachelor) Computer Science (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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	data record Lehramt Gymnasien Informatik - 2025	

Module title			Abbreviation			
Advanced Programming 10-I-APR-172-m01						
Modul	e coord	inator		Module offered by		
holder of the Chair of Computer Science II		°e	Institute of Computer Science			
ECTS	Metho	od of grading	Only after succ. con	nol. of module(s)		
5	nume	rical grade				
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	nts					
With th grams and co de a se cussed	ne know . If more ode dup ensible d.	vledge of basic programn e complex problems are t licates occur. In this lect structure. Also, further to	ning, taught in introd to be tackled, subopt ure, further knowledg opics in the areas of s	uctory lectures, it is p imal results like long ge is to be conveyed o oftware security and	oossible to realize si , incomprehensible on how to give progr parallel programmin	mpler pro- functions ams and co- ng are dis-
Intend	ed lear	ning outcomes				
Studer then ir allel pr sing.	nts learı npleme rocessir	n advanced programming nted in multiple languag ng concepts are introduc	g paradigms especial es and their efficienc ed culminating in the	ly suited for space ap y measured using sta use of GPU architect	oplications. Differen andard metrics. In ac tures for extremely q	t patterns are ddition, par- uick proces-
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
ster, ir writter If anno examin prox. 1 Langua credita Alloca	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus Allocation of places					
Additio	onal inf	ormation				
Workle	bad					
150 n						
Teachi	ng cyci	e				
 Deferre		IDOL (avamination rage	lations for tooshing			
Referre		LPUT (examination regu		legree programmes)		
9 22 II	Nr. 3 D)					
Modul	e appea	irs in				
Bache Modul Master Master Supple Bache	lor's de e studie r's degr r's degr r's teacl ementai	gree (1 major) Computer gree (1 major) Computer S ee (1 major) Nanostructu ee (1 major) Physics (202 ning degree Gymnasium y course MINT Teacher E gree (1 major) Business I	Science (2017) Science (2019) re Technology (2020) 20) MINT Teacher Educat ducation PLUS, Elite nformation Systems	ion PLUS, Elite Netwo Network Bavaria (EN (2020)	ork Bavaria (ENB) (20 B) (2020)	020)
LA Gymna	sien Comp	uter Science (2025)	JMU Würzburg data record	g•generated 18-Jun-2025•e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 100 / 171

Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Master's degree (1 major) Quantum Technology (2021) Bachelor's degree (1 major) Business Information Systems (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Business Information Systems (2023) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024) Bachelor's degree (1 major) Business Information Systems (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Digital Business & Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

Module title			Abbreviation			
Automa	Automation and Control Technology 10-I-AR-152-mo1					
Module	e coordinator		Module offered by			
holder of the Chair of Computer Science VII		nce VII	Institute of Comput	er Science		
ECTS	Method of grading	Only after succ. compl. of module(s)				
8	numerical grade		•			
Duratio	n Module level	Other prerequisites	6			
1 seme	ster undergraduate					
Conten	ts					
Overvie differer structur sistent stems,	ew of automation systems, for ntial equations, nomenclature re images and structure imag control deviation, controller o eigenvalue based system and	undations of control ted e, transfer function, ste e reduction, locus curv lesign through parame alysis, classification of	chnology, simple des o response and reali- es and Bode diagram ter optimisation, bas automation and con	ign methods, model sing of easy linear co ns, frequency charac sics of fuzzy control, trol systems, exampl	creation, ontrollers, teristic, per- scanning sy- les.	
Intende	ed learning outcomes					
The stu	dents master the fundamenta	als of automation and o	ontrol.			
Course	s (type, number of weekly cor	ntact hours, language –	- if other than Germa	n)		
V (4) +	Ü (2)			,		
Method	d of assessment (type, scope,	language — if other th	an German, examina	tion offered — if not	every seme-	
examin prox. 15 Langua credital	unced by the lecturer at the b ation of one candidate each 5 minutes per candidate). ge of assessment: German ar ble for bonus	éginning of the course, (approx. 20 minutes) oi nd/or English	the written examination	tion may be replaced	idates (ap-	
Allocat	ion of places					
Additio	nal information					
Worklo	ad					
240 h						
Teachir	ng cycle					
Referre	d to in LPO I (examination re	gulations for teaching-	degree programmes)			
§ 22	Nr. 3 b)					
Module	e appears in					
Bachelo	or's degree (1 major) Mathem	atics (2015)				
Bachelor's degree (1 major) Computational Mathematics (2015)						
Bachelor's degree (1 major) Aerospace Computer Science (2015)						
Bachelor's degree (1 major) Aerospace Computer Science (2017)						
Bachelor's degree (1 major) Aerospace Computer Science (2020)						
Bachelor's degree (1 major) Computer Science and Sustainability (2021)						
Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Games Engineering (2025)						
Bachelor's degree (1 major) Games Engineening (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025)						
First state examination for the teaching degree Gymnasium Computer Science (2025)						
LA Gymnasi			,	<i></i>		



Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation		
Operating Systems				10-l-BS-242-m01	
Module coo	rdinator		Module offered by		
holder of th	e Chair of Computer Scienc	e ll	Institute of Comput	er Science	
ECTS Me	hod of grading	Only after succ. com	pl. of module(s)		
5 nur	nerical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate				
Contents					
Introduction sing in open ry managen	n to computer systems, dev ating systems, processes a nent, device and file manag	elopment of operatin nd threads, CPU sche ement, operating sys	g systems, architect eduling, synchronisa tem virtualisation.	ure principles, interrupt proces- tion and communication, memo-	
Intended le	arning outcomes				
The student	s possess knowledge and	practical skills in buil	ding and using esse	ntial parts of operating systems.	
Courses (ty	pe, number of weekly conta	ict hours, language —	if other than Germa	n)	
V (2) + Ü (2)		· · · · · · · · · · · · · · · · · · ·		· ·	
Method of a ster, inform	ssessment (type, scope, la ation on whether module c	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
examination prox. 15 min Language o creditable f	n of one candidate each (ap nutes per candidate). f assessment: German and pr bonus	oprox. 20 minutes) or /or English	an oral examination	in groups of 2 candidates (ap-	
Allocation of	f places				
Additional	nformation				
Workload					
150 h					
Teaching cy					
		-			
Referred to	in IPOI (examination regu	lations for teaching-r	legree programmes)		
8 22 II Nr 2					
S 22 in Ni. 5 DJ, S 09 Mi. 1 CJ					
Pachalar's degree (a maior) Duciness Information Systems (ass c)					
Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025)					
Bachelor's	degree (1 major) Computer	Science and Sustaina	bility (2025)	.02)	

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.		
	data record Lehramt Gymnasien Informatik - 2025		

Module title			Abbreviation		
Computer Vision 10-I-CV-222-m01					10-I-CV-222-m01
Module	e coord	inator		Module offered by	
holder of the Chair of Computer Science		e IV	IV Institute of Computer Science		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conten	nts				
Inis co the rec It show is cons turns to near fil proced the rec zed. A	eurse ai ent use sidered o image lters) us lures to cognitio large pa	ms at offering a self-cont of deep learning. It start image processing is ente and the image acquisitio e representation and disc sed to enhance image qu extract information from n of objects (specific and art of the course concerns	ained account of con s with an overview of ring multiple fields fr n cameras and illum retization, and descr ality and/or detect sp multiple images, wit l/or class level) will b s deep learning and <i>l</i>	nputer vision and its f existing and emergi om our daily life. Firs ination sources are a ibes pre-processing pecific features. The ch motion and 3D sha be discussed and diff Al-based approaches	underlying concepts, including ing computer vision applications. st, the light-matter interaction also discussed. The course then steps (such as linear and non-li- course will continue by analyzing ape as major examples. Finally, ferent approaches will be analy- s to vision tasks.
Intend	ed lear	ning outcomes	· · ·		
• L t t • L • L • L	Underst cure, sa cracking Underst Deployn Underst sed on p	anding of important com mpling, quantization, en , object recognition. anding of deep learning (nent of vision and learnin anding of vision problem particular algorithms.	Muter vision concep hancement, feature (MLP, ConvNets, arch ng algorithms from st s, and the ability to p	ts: light, matter, acq extraction, segmenta itectures) and the ap andard libraries. propose, debug, valio	pulsition of images, color, tex- ation, 3D acquisition, motion, oplication to visual data. date and explain solutions ba-
Courses (type, number of weekly contact hours, language — if other than German)					
V (2) + Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Metho ster, in	d of ass Iformati	essment (type, scope, la on on whether module ca	nguage — if other than be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written If anno examir prox. 1 Langua credita	written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus				
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Doforre	ad to in	IPOL (avamination room	lations for toaching	dograa programmaa	
				aegree programmes)	
S 22 II	(U & . IVI	ve in			
Module	e appea	irs in			

LA Gymnasien Computer Science (2025) JMU Würzburg • generated 18-Jun-2025 • exam. reg. data record Lehramt Gymnasien Informatik - 2025 Bachelor's degree (1 major) Mathematical Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Games Engineering (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation		
Databases 10-I-DB-152-m01					
Module coordinator			Module offered by		
Dean of Studies Informatik (Computer Science)		Institute of Comput	er Science		
ECTS	Method of grading	Only after succ. con	Only after succ. compl. of module(s)		
5	numerical grade				
Duratio	on Module level	Other prerequisites			
1 seme	ster undergraduate				
Conten	ts				
Relatio ment.	nal algebra and complex SQL	statements; database	planning and norma	l forms; transaction I	manage-
Intende	ed learning outcomes				
The stu	idents possess knowledge ab	out database modelling	g and queries in SOL	as well as transaction	ons.
Course	s (type number of weekly con	tact hours language -	if other than Germa	n)	
V(a)		tact nours, tanguage –		11)	
V (2) +					
Method ster, in	d of assessment (type, scope, formation on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written If anno examin prox. 19 Langua credita	examination (approx. 60 to 1: unced by the lecturer at the br nation of one candidate each (5 minutes per candidate). uge of assessment: German ar ble for bonus	20 minutes). eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examination	tion may be replaced in groups of 2 cand	d by an oral idates (ap-
Allocat	ion of places				
	F				
Additio	nal information				
Auuitio					
worklo					
150 h					
Teachi	ng cycle				
Referre	ed to in LPO I (examination reg	gulations for teaching-	degree programmes)		
§491N §691N	Vr. 1 b) Vr. 1 b)				
Module	e appears in				
Bachel	or's degree (1 maior) Compute	r Science (2015)			
Bachel	or's degree (1 major) Mathema	atics (2015)			
Bachel	or's degree (1 major) Business	Information Systems	(2015)		
Bachelor's degree (1 major) Computational Mathematics (2015)					
Bachelor's degree (1 major) Aerospace Computer Science (2015)					
Bachelor's degree (1 major) Functional Materials (2015)					
First state examination for the teaching degree Realschule Computer Science (2015)					
First sta	First state examination for the teaching degree Gymnasium Computer Science (2015)				
Master	Master's degree (1 major) Physics (2016)				
Bachelor's degree (1 major) Business Information Systems (2016)					
Bachelor's degree (1 major) Aerospace Computer Science (2017)					
Bachel	or's degree (1 major) Compute	r Science (2017)			
LA Gymnas	ien Computer Science (2025)	JMU Würzburg data record l	g• generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. k - 2025	page 107 / 171

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Bachelor's degree (1 major) Computer Science (2019) Bachelor's degree (1 major) Business Information Systems (2019) Bachelor's degree (1 major) Business Information Systems (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Functional Materials (2021) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Business Information Systems (2021) Bachelor's degree (1 major) Mathematical Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Business Information Systems (2023) Bachelor's degree (1 major) Business Information Systems (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Functional Materials (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)
Module title				Abbreviation		
Compu	Computer Science Education 1 (incl. Practical Course in the Application of				10-l-DDl1-152-m01	
Compu	Computer Science Systems form an Educational Point of View)					
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on otor	Module level	Other prerequisites			
2 seme	ster	undergraduate				
Conten	ts					
The mo	dule gi al appli	ves an overview of comp ication in the classroom.	uter science didactic	s. It demonstrates a	nd discusses possibilities for a	
Intende	ed leari	ning outcomes				
Studen and me topics. well as ses.	ts are f edia for Studer guidel	amiliar (in particular in th teaching topics in comp nts are familiar with both ines and standards for te	te area of computer s uter science. They are historical and curren aching computer scie	cience in <i>Sekundars</i> e able to didactically t teaching approach ence. They are able t	<i>stufe I)</i> with methods, techniques analyse and prepare practical es, typical teaching methods as o plan, organise and deliver clas-	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) +	<u>Ü (2) +</u>	P (2)				
Method ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If anno examin prox. 1 <u>y</u> credita	examinunced exation of minut ble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap ces per candidate). bonus	minutes). inning of the course, prox. 20 minutes) or	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 49 N § 69 N	§ 49 Nr. 2 § 69 Nr. 2					
Module appears in						
First sta	ate exa	mination for the teaching	degree Realschule C	computer Science (20	015)	
First sta	ate exa	mination for the teaching	degree Gymnasium	Computer Science (2	2015)	
First sta	ate exa	mination for the teaching	degree Realschule C	omputer Science (2	025)	
First sta	First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title					Abbreviation
Comput	ter Scie	ence Education 2			10-l-DDl2-GY-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	Contents				
This co ses pos	urse di sibiliti	scusses different topics i es for a practical applica	n computer science of the second test of test	lidactics in more det	tail. It demonstrates and discus-
Intende	ed leari	ning outcomes			
The stu and ana assess	dents a alysis c these.	are able to plan, execute of computer science class	and assess projects, ses, master fundamer	are familiar with imp ntal teaching and lea	portant aspects of the planning arning strategies and are able to
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Methoo ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written If annot examin prox. 15 credital	examin unced ation o 5 minut ble for	nation (approx. 60 to 120 by the lecturer at the beg f one candidate each (ap es per candidate). bonus	minutes). inning of the course, oprox. 20 minutes) or	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
120 h					
Teachir	ng cycl	9			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
§691N	§ 69 Nr. 2 and § 69 Nr. 1 c): Rechnerarchitektur				
Module	appea	irs in			
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2015)
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)

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Module title				Abbreviation		
Deep L	.earning	5			10-l-DL-222-m01	
Modul	e coord	inator		Module offered by		
Dean c	of Studio	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Durati	on	Module level	Other prerequisites	;		
1 seme	ester	undergraduate				
Conter	nts					
The lecture provides advanced knowledge of deep learning techniques such as FCN, CNN and LSTMs, practical application examples for NN architectures, e.g. in the field of image and speech processing. Current models and methods of machine learning and their technical background are presented. Building on this, models from the field of deep learning, such as CNNs, RNNs and sequence-to-sequence architectures, are discussed. The theoretical foundations of these models, such as training through backpropagation, are also discussed in detail. For all the models covered, it is shown how they are used in practice for specific problems such as image processing and text generation.						
Intend	ed lear	ning outcomes				
Studer res and res fro	nts have d how tl m the li	e knowledge of the possi ney are implemented in t terature, of data prepara	ble applications and tools such as Tensorf tion and of solving co	limitations of deep low/Keras, of the abi low/Keras, of the abi oncrete tasks.	earning, of importan lity to reprogram net	t architectu- twork structu-
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Metho ster, in	d of ass Iformati	s essment (type, scope, la on on whether module c	anguage — if other th an be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written If annc examin prox. 1 credita	examin ounced nation o 5 minut oble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (a es per candidate). bonus	o minutes). ginning of the course, pprox. 20 minutes) or	the written examina an oral examination	tion may be replace in groups of 2 cand	d by an oral idates (ap-
Alloca	tion of p	olaces				
Additid	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	ulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)					
Module appears in						
Bache	lor's de	gree (1 major) Mathemat	ical Data Science (20	22)		
Bache	lor's de	gree (1 major) Artificial Ir	ntelligence and Data S	Science (2022)		
Bache	lor's de	gree (1 major) Artificial Ir	ntelligence and Data S	Science (2023)		
Bache	lor's de	gree (1 major) Artificial Ir	ntelligence and Data S	Science (2024)		
Bachelor's degree (1 major) Games Engineering (2025)						
Bache	Bachelor's degree (1 major) Computer Science (2025)					
First st	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)	
Bache	ior's de	gree (1 major) Computer	Science and Sustaina	DILITY (2025)	yam reg	nage 111 / 171
eA Gymna:	sien compi	2025	data record l	Lehramt Gymnasien Informati	k - 2025	page 111 / 1/1

Module title					Abbreviation
Hands-	Hands-on Computer Science				10-I-DPP-152-m01
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	undergraduate			
Conten	ts				
Design papers shops. topic, s in grou work. Ir pupils	Design and implementation of a school project on a topic in computer science, e. g. for project days, school term papers (<i>Facharbeiten</i>), <i>Pluskurse</i> (additional courses for the in-depth study of areas of special interest), work-shops. 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.				
Intende	ed learr	ning outcomes			
The stu are able le to cri	dents a e to ela tically	are able to select a topic borate it. They are familia reflect the process.	from the area of comp ar with different aspe	outer science that is cts of project planni	suitable for a school project and ng and management and are ab-
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
Ü (2) +	S (2)				
Methoo ster, in	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
practica Assess	al assig ment o	nment (preparing and de ffered: Only in the semes	elivering a school lab ster in which the cours	session) with exami se is offered	ination talk (approx. 15 minutes)
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
180 h					
Teachi	ng cycl	9			
Teachir	ng cycle	e: Usually every 2 years			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22 § 22	§ 22 Nr. 2 f) § 22 Nr. 3 f)				
Module	Module appears in				
First sta First sta First sta First sta	First state examination for the teaching degree Realschule Computer Science (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)				

Module	Module title Abbreviation					
Practic	al Cour	se on Computer Science	Education		10-I-DPR-152-m01	
Module	e coord	inator		Module offered by		
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Discuss aspects science	sion of 5, in pa e didact	problems in programmin rticular subject-specific f ;ics as well as possible a	g in the computer sci oundations, didactic pproaches in the clas	ence classroom that analyses, the conte ssroom.	t takes into account different mporary debate in computer	
Intende	ed learr	ning outcomes				
The stu classro	dents a om, tal	are able to discuss centra king into account subject	ll topics and question -specific, didactic an	ns of programming in d methodical aspect	n the computer science ts.	
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	in)	
Ü (2)						
Methoo ster, in	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
practica Assess	al assig ment o	ment with examination ffered: Only in the semes	talk (approx. 15 minu ter in which the cour	utes) se is offered		
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
120 h						
Teachir	ng cycl	e				
Teachir	ng cycle	e: Usually every 2 years				
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 22 § 22	§ 22 Nr. 2 f) § 22 Nr. 3 f)					
Module	e appea	rs in				
First sta First sta First sta First sta	First state examination for the teaching degree Realschule Computer Science (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title				Abbreviation
Robotics in Edu	cation (practical course	2)		10-l-DRO-152-m01
Module coordin	nator		Module offered by	
Dean of Studies	s Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS Method	l of grading	Only after succ. com	pl. of module(s)	
4 (not) su	ccessfully completed			
Duration I	Module level	Other prerequisites		
1 semester l	undergraduate			
Contents				
Discussion of p in particular sul dactics as well	roblems in robotics in tl bject-specific foundatio as possible approaches	he computer science ns, didactic analyses in the classroom.	classroom that take , the contemporary o	s into account different aspects, debate in computer science di-
Intended learni	ng outcomes			
The students ar king into accou	e able to discuss centra nt subject-specific, dida	Il topics and question actic and methodical	ns of robotics in the aspects.	computer science classroom, ta-
Courses (type, 1	number of weekly conta	ct hours, language —	if other than Germa	n)
Ü (2)				
Method of asse ster, informatio	e ssment (type, scope, la n on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
practical assign Assessment off	nment (supervision of a ered: Only in the semes	group of pupils) with ter in which the cour	examination talk (a se is offered	pprox. 15 minutes)
Allocation of pl	aces			
Additional info	rmation			
Workload				
120 h				
Teaching cycle				
Teaching cycle:	Usually every 2 years			
Referred to in L	POI (examination regu	lations for teaching-c	legree programmes)	
§ 22 Nr. 2 f) § 22 Nr. 3 f)				
Module appears	s in			
First state examination for the teaching degree Realschule Computer Science (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)				

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Module title					Abbreviation
Semina	r Com	outer Science Education			10-l-DS-152-m01
Module	coord	inator		Module offered by	
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
Conten	Contents				
Selecte	d topic	s in computer science di	dactics.		
Intende	ed leari	ning outcomes			
The stu selves v subject	The students gain initial experience in the area of independent scientific work. They are able to acquaint them- selves 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	s (type	, number of weekly conta	ct hours, language —	if other than Germa	ın)
S (2)					
Method ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written pic from Assessi	elabor n the fi ment o	ation (approx. 20 pages) eld of computer science of ffered: Only in the semes	and presentation inc didactics ter in which the cour	luding discussion (a se is offered	approx. 45 to 60 minutes) on a to-
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
120 h					
Teachir	ng cycl	e			
Teachin	ng cycle	e: usually once a year			
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 22 N § 22 N	Nr. 2 f) Nr. 3 f)				
Module	appea	ars in			
First sta First sta First sta First sta	First state examination for the teaching degree Realschule Computer Science (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)				

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Module	Module title Abbreviation					
Advanc	ed Top	ics of Computer Science	Education		10-I-DV-152-m01	
Module	e coord	inator		Module offered by		
Dean of	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Discuss particul tics as	sion of lar sub well as	topics in teaching compu ject-specific foundations possible approaches in t	uter science in <i>Gymno</i> , didactic analyses, tl the classroom.	asium that takes into he contemporary del	account different aspects, in bate in computer science didac-	
Intende	ed lear	ning outcomes				
The stu into aco	dents a count s	are able to discuss centra ubject-specific, didactic	I topics and issues o and methodical aspe	n teaching compute cts.	r science in a <i>Gymnasium</i> , taking	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
S (2)						
Methoo ster, int	l of ass formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) talk (b) pract Assess	(approx tical as ment o	k. 30 minutes) or signment (exercise) with ffered: Only in the semes	examination talk (ap ter in which the court	prox. 15 minutes) se is offered		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
120 h						
Teachir	ıg cycl	e				
Teachir	ng cycle	e: Usually every 2 years				
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)		
§ 22 § 22	Nr. 2 f) Nr. 2 f),	§ 22 Nr. 3 f)				
Module	Module appears in					
First sta	ate exa	mination for the teaching	g degree Realschule C	Computer Science (2	015)	
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2015)	
First sta	ate exa	mination for the teaching	degree Realschule C	Computer Science (2	025)	
First sta	First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title				Abbreviation	
Funda	mentals of Programming			10-I-GdP-172-m01	
Madul			Madula offered by	,	
Modul			Module offered by		
holder	of the Chair of Computer Scie	nce II	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
5	numerical grade				
Durati	on Module level	Other prerequisites			
1 seme	ester undergraduate				
Conter	nts				
Data ty ject ori	Data types, control structures, foundations of procedural programming, selected topics of C, introduction to object orientation in Java, selected topics of C++, further Java concepts, digression: scripting languages.				
Intend	ed learning outcomes				
The sti	idents possess a fundamenta	knowledge about prog	gramming languages	(in particular lava (and (++)
and ar	e able to independently develo	op average to high leve	l Java programs.	(in purificatal juva, (
Course	es (type, number of weekly cor	itact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)				
Metho ster, in	d of assessment (type, scope, formation on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
writter	examination (approx 60 to 1	20 minutes)			
If anno	ounced by the lecturer at the b	eginning of the course,	the written examina	tion may be replace	d by an oral
examir	nation of one candidate each (approx. 20 minutes) or	an oral examination	in groups of 2 cand	idates (ap-
prox. 1	5 minutes per candidate).				
credita	ble for bonus				
Alloca	tion of places				
Additio	onal information				
Worklo	bad				
150 h					
Teachi	ng cycle				
Referre	ed to in LPO I (examination re	gulations for teaching-	degree programmes)		
§ 49	Nr. 1 b)				
§6911	Nr. 1 b)				
Modul	e appears in				
Bache	lor's degree (1 major) Physics ((2015)			
Bache	lor's degree (1 major) Aerospa	ce Computer Science (2	2017)		
Bache	lor's degree (1 major) Compute	er Science (2017)			
Bache	lor's degree (1 major) Compute	er Science (2019)			
Bachelor's degree (1 major) Business Information Systems (2020)					
Bachelor's degree (1 major) Physics (2020)					
Bache	lor's degree (1 major) Aerospa	ce Computer Science (2	2020)		
Bache	lor's degree (1 major) Compute	er Science and Sustaina	ability (2021)		
Bache	Bachelor's degree (1 major) Business Information Systems (2021)				
Bachel	ior's degree (1 major) Mathema	atical Data Science (20	22) Seienee (essa)		
Bachel	lor's degree (1 major) Artificial	Intelligence and Data S	Science (2022)		
Баспе	ior 5 degree (1 major) Artificial	intelligence and Data S	Science (2023)		
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Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Business Information Systems (2023) Bachelor's degree (1 major) Business Information Systems (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Economathematics (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Modul	e title				Abbreviation	
Thesis	Compu	ter Science (Teaching De	gree at the German (Gymnasium)	10-I-HA-GY-152-m01	
Modul	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
		undergraduate				
Conter	Its					
Resear time fra	ching a ame an	nd writing on a defined p d adhering to the princip	roblem in computer les of good scientific	science or computer practice.	science didactics within a given	
Intend	ed lear	ning outcomes				
The stu practic	idents a e.	are able to research and v	write on a defined pro	oblem, adhering to t	he principles of good scientific	
Course	s (type	, number of weekly conta	ct hours, language —	- if other than Germa	n)	
No cou	rses as	signed to module				
Metho ster, in	d of ass formati	sessment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
Hausar to 300 Langua ons for	rbeit (th hours) age of a teachi	nesis) pursuant to Sectior ssessment: German; exc ng-degree programmes)	n 29 LPO I (examinati eptions pursuant to S	on regulations for te Section 29 Subsectio	aching-degree programmes) (250 on 4 LPO I (examination regulati-	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 29						
Modul	e appea	ars in				
First st	ate exa	mination for the teaching	degree Gymnasium	Computer Science (2	2015)	
First st	First state examination for the teaching degree Gymnasium Computer Science (2025)					

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Module title			Abbreviation			
Practic	al cour	se in hardware			10-I-HWP-152-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Practica a comp	al expe lete mi	riments on hardware as croprocessor.	pects, for example in	communication tech	nology, robots or the	structure of
Intende	ed learı	ning outcomes				
The stu scriptic results.	The students are able to independently review, prepare and perform experiments with the help of experiment de- scriptions, to independently search for additional information as well as to document and evaluate experiment results.					
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
P (6)						
Methoo ster, in	d of ass formati	e ssment (type, scope, on on whether module	language — if other tha can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
portfoli (approx	io: com x. 10 mi	pletion of approx. 3 to a nutes per project)	o project assignments	s (approx. 250 hours	total) and presentat	ion of results
Allocat	ion of p	olaces				
	•					
	nal inf	ormation				
Huuntio						
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Roforro	d to in	IPOI (examination reg	ulations for teaching.	legree programmes)		
S a a ll l						
9 22 11 1	vr. 3 b)	•				
Module	e appea	irs in				
Bachelor's degree (1 major) Mathematics (2015) Bachelor's degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major) Aerospace Computer Science (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Bachelor's degree (1 major) Aerospace Computer Science (2017) Bachelor's degree (1 major) Computer Science (2017) Bachelor's degree (1 major) Computer Science (2019)						
Module studies (Bachelor) Computer Science (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021)						
LA Gymnas	ien Compi	uter Science (2025)	JMU Würzburg data record l	g • generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. k - 2025	page 120 / 171

Bachelor's degree (1 major) Mathematics (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation			
Interac	Interactive Computer Graphics 10-I-ICG-152-m01					
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scie	nce IX	Institute of Computer Science		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade		1		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	Contents					
Compu- cificall conten about l jection line wi Accom or Dire Intend	Computer graphics studies methods for digitally synthesising and manipulating visual content. This course spe- cifically concentrates on interactive graphics with an additional focus on 3D graphics as a requirement for many contemporary as well as for novel human-computer interfaces and computer games. The course will cover topics about light and images, lighting models, data representations, mathematical formulations of movements, pro- jection as well as texturing methods. Theoretical aspects of the steps involved in ray-tracing and the raster pipe- line will be complemented by algorithmical approaches for interactive image syntheses using computer systems. Accompanying software solutions will utilise modern graphics packages and languages like OpenGL, GLSL and/ or DirectX. Intended learning outcomes At the end of the course, the students will have a broad understanding of the underlying theoretical models of					
active	graphic	s applications and to c	hoose the right softwa	re tool for this task.		n own miei-
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Addition						
···						
workic	bad					
150 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22	Nr. 3 b)					
Module appears in						
First state examination for the teaching degree Gymnasium Computer Science (2015) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021)						
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Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module	e title				Abbreviation	
Compu	Computer Science and Ethics			10-l-luE-212-m01		
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
The cor comput nisms c	ntent of ter scie or algor	f the module focuses on t nce (e.g. in implementat rithms, in the operation o	he connection betwe ion) and also technic f systems or network	en ethics and comp al possibilities (e.g. s).	uter science, implications for in the design of software, mecha-	
Intende	ed learı	ning outcomes				
The aim module on ethic	n of the e, stude cal con	module is the scientific ents have a basic awaren flict cases.	discourse on ethical ess of computer scie	problems in comput nce based on hypoth	er science. After completing the netical but realistic case studies	
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
V/S (2)						
Methoo ster, in	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
a) writte b) term Langua	en exai paper ge of a	mination (approx. 60 to 1 (10 to 15 pages) and pres ssessment: German and,	20 minutes) or sentation (30 to 45 m /or English	inutes) with subsequ	uent discussion	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad		,			
150 h						
Teachir	ng cycl	e				
Teachir	ng cycle	e: every year, winter seme	ester			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)						
Module	e appea	urs in				
Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2021)					
First sta	First state examination for the teaching degree Realschule Computer Science (2025)					
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)	
Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title			Abbreviation		
Crypto	Cryptography and Data Security 10-I-KD-191-m01				
Modul	e coordinator		Module offered by		
Dean o	of Studies Informatik (Comput	er Science)	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. cor	npl. of module(s)		
5	numerical grade				
Durati	on Module level	Other prerequisites	i		
1 seme	ester undergraduate				
Conter	nts				
Private RSA, D millior	e key cryptography systems, V iffie-Hellman, Elgamal, Goldw aire problem, secure circuit e	ernam one-time pad, A asser-Micali, digital sig valuation, homomorph	ES, perfect security, gnature, challenge-re ous encryption.	oublic key cryptogra sponse methods, se	phy systems, cret sharing,
Intend	ed learning outcomes				
The stu stems, wasse evalua	udents possess a fundamenta Vernam one-time pad, AES, p r-Micali, digital signature, cha tion, homomorphous encrypt	l and applicable knowl perfect security, public l llenge-response metho ion	edge in the areas of key cryptography, RS d, secret sharing, mi	private key cryptogra A, Diffie-Hellman, El llionaire problem, se	aphy sy- gamal, Gold- ecure circuit
Course	es (type, number of weekly con	ntact hours, language –	– if other than Germa	ın)	
V (2) +	Ü (2)				
Metho ster, ir	d of assessment (type, scope, iformation on whether module)	, language — if other th e can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
examin prox. 1 Langua Assess credita	nation of one candidate each 5 minutes per candidate). age of assessment: German an sment offered: In the semeste able for bonus	(approx. 20 minutes) or nd/or English r in which the course is	r an oral examination offered and in the su	i in groups of 2 cand ubsequent semester	idates (ap-
Alloca	tion of places				
Additi	onal information				
Worklo	bad				
150 h					
Teachi	ng cycle				
Referr	ed to in LPO I (examination re	gulations for teaching-	degree programmes)		
§ 22	Nr. 3 b)				
Module appears in					
Bachelor's degree (1 major) Computer Science (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)					
LA Gymna:	sien Computer Science (2025)	JMU Würzbur data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 125 / 171

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation		
Artificia	Artificial Intelligence				10-I-KI-252-m01
Module	coord	inator		Module offered by	
				Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster				
Conten	ts				
Intende	ed learr	ning outcomes			
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Module	Ü (2) taugh	t in: German and/or Engl	ish		
Methoo ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
lf annor examin prox. 15 Langua credital	examir unced l ation o 5 minut ge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg f one candidate each (ap es per candidate). ssessment: German and, bonus	minutes) or inning of the course, pprox. 20 minutes) or /or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	9			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22 § 69 N	§ 22 Nr. 3 b) § 69 Nr. 1 b)				
Module	Module appears in				
First sta First sta	ate exa	mination for the teaching mination for the teaching	g degree Realschule C g degree Gymnasium	omputer Science (20 Computer Science (2	025) 2025)

Module title Abbreviation						
Compu	Itationa	l Complexity			10-I-KT-191-m01	
Modul	e coord	inator		Module offered by		
Dean c	of Studie	es Informatik (Compute	er Science)	Institute of Computer Science		
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade		£		
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	Contents					
Comple sumpti thods,	Complexity measurements and classes, general relationships between space and time classes, memory con- sumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation me- thods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.					
Intend	ed learı	ning outcomes				
The stu classes determ proble	udents µ s, gener ninism v ms, Tur	oossess a fundamental ral relationships betwe ersus indeterminism, h ing reduction, interacti	and applicable knowl en space and time clas hierarchical theorems, ve proof systems.	edge in the areas of sses, memory consur translation methods	complexity measure nption versus comp , P-NP problem, com	ments and utation time, pleteness
V(2) +	<u> </u> (2)	number of weekly con				
Metho		essment (type, scope,	 language — if other th	an German, examina	tion offered — if not	every seme-
ster, in	formati	on on whether module	can be chosen to earn	a bonus)		every serie
examir prox. 1 Langua Assess credita	nation o 5 minut age of a sment o ible for	f one candidate each (es per candidate). ssessment: German an ffered: In the semester bonus	approx. 20 minutes) of d/or English in which the course is	r an oral examination offered and in the ຣເ	in groups of 2 cand	idates (ap-
Alloca	cion of p	olaces				
Additio	onal inf	ormation				
workii	Jau					
Teachi		a				
reacin	ing cycl	2				
Referre	d to in	IPOI (examination reg		degree programmes)		
8 22 II	Nr 3h)					
Modul	e annea	rs in				
Bachel	or's de	gree (1 major) Compute	er Science (2010)			
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)						
LA Gymnas	sien Compi	iter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. ik - 2025	page 128 / 171

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

Module title			Abbreviation			
Introduction to Aviation Systems			10-I-LFS-172-m01			
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Physica	al found	lations of aircraft aerody	namics, flight stabilit	y, airplane technolo	gy and structure of aircraft, foun-	
dations	s of avia	• • • •	able material.			
Intende	ed lear	ning outcomes				
The stu correct culation	Idents ly ident ns for s	possess the theoretical a ify the most important sy elected basic system ele	nd practical knowled /stem relationships, f ments.	ge necessary to corr ormulate requireme	ectly classify aerospace systems, nts for new systems and do cal-	
Course	s (type	number of weekly conta	ct hours, language —	if other than Germa	n)	
V (2) +	Ü (1)	,			,	
Methoo ster, in	d of ass formati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If anno examin credita	examinunced ation o ble for	nation (approx. 60 to 120 by the lecturer at the beg if one candidate each (ap bonus	minutes) inning of the course, prox. 30 minutes).	the written examina	tion may be replaced by an oral	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Bachelor's degree (1 major) Aerospace Computer Science (2017) Module studies (Bachelor) Orientierungsstudien (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2021)						

Module title			Abbreviation			
Logic fo	or infor	matics			10-l-LOG-152-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Metho	d of grading	Only after succ. con	pl. of module(s)		
5	numei	ical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Syntax nite for	Syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infi- nite formula sets, syntax and semantics of predicate logic.					
Intende	ed learr	ing outcomes				
The stu normal	dents a forms,	are proficient in the foll Horn formulas, SAT, re	owing areas: syntax an solution, infinite formu	d semantics of prop Ila sets, syntax and s	ositional logic, equiv semantics of predica	valence and ite logic.
Course	s (type,	number of weekly con	tact hours, language –	- if other than Germa	n)	
V (2) +	Ü (2)					
Methoo ster, in	l of ass formati	essment (type, scope, on on whether module	language — if other the can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocat	ion of p	laces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	9				
Referre	d to in	LPOI (examination reg	gulations for teaching-o	degree programmes)		
§ 22	Nr. 3 b)					
Module	e appea	rs in				
Bachel	or's deg	gree (1 major) Compute	r Science (2015)			
Bachel	or's deg	gree (1 major) Mathema	itics (2015))		
Bachelor's degree (1 major) Computational Mathematics (2015)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS. Elite Network Bavaria (FNB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Bachelor's degree (1 major) Computer Science (2017)						
Bachelor's degree (1 major) Computer Science (2019)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Supple	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)					
Bachel	or's deg or's deg	gree (1 major) Aerospac	r Science and Sustaina	ability (2021)		
LA Gymnas	ien Compu	iter Science (2025)	JMU Würzburg data record l	ehramt Gymnasien Informati	xam. reg. k - 2025	page 131 / 171

Bachelor's degree (1 major) Mathematics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's degree (1 major) Games Engineering (2025)

Bachelor's degree (1 major) Aerospace Computer Science (2025)

Bachelor's degree (1 major) Computer Science (2025)

First state examination for the teaching degree Realschule Computer Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation			
Introd	uction i	nto Human-Computer I	nteraction		10-I-MCS-242-m01	
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scie	nce IX	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
	on octor	Module level	Other prerequisites			
Conter	Contents					
Humar stems. techni design humar evalua means Accom evalua	n-Comp . Specia cal pring ling usa n percep tion me s of inter panying tion.	uter Interaction studies l focus lies on fundam cipals and models of n ble and human-oriente otion and cognition, the thods, principles of co raction, from text-base g practical tasks conve	s the design, evaluation ental psychological and nodern computer system ed interactions with tect e human memory and a mputer systems, input d input methods over g y to the students typica	n, and implementation d physiological proper- ms, as well as on the hnical systems. The attention, the design processing technique graphical user interfar al methods of require	on of interactive com erties of the human us derived boundary co topics of this course of interactive systen ues, human interface ces to multi-modal in ement analysis, prote	puter sy- users, the onditions of cover the ns, popuplar es and typical nterfaces. otyping and
Intend	ed learı	ning outcomes				
After s face do tions c les.	uccessf esign pr of mode	ully completing this co inciples. They underst rn user interfaces. The	urse, students have a f and the possibilities ar / know the necessary s	fundamental underst nd limitations of tech teps of user-centric o	anding of human-co nology and user and design and typical de	mputer inter- l the applica- esign princip-
Course	es (type	, number of weekly cor	itact hours, language –	- if other than Germa	in)	
V (3) +	Ü (1)					
Metho ster, ir	d of ass formati	essment (type, scope, on on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
a) writ b) pres c) oral Langua credita	ten exar sentatio examin age of a able for	nination (approx. 120 n (30 to 60 minutes) o ation of one candidate ssessment: German ar bonus	minutes) or r each (30 to 60 minute nd/or English	s)		
Alloca	tion of p	olaces				
Additi	onal inf	ormation				
			_			
Worklo	oad					
150 h						
Teaching cycle						
 Peferred to in LPO L (examination regulations for teaching degree programmes)						
§ 22 Nr. 3 h)						
Modul	Module appears in					
Bachelor's degree (1 major) Business Information Systems (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025)						
First st	ior s deg ate exa	mination for the teach	ng degree Gymnasium	Computer Science (2	2025)	
LA Gymna:	sien Compi	uter Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informati	xam. reg. k - 2025	page 133 / 171



Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title			Abbreviation	
Model-based Systems Engineering			10-I-MSE-252-m01	
Module coordinator		Module offered by		
		Institute of Compute	er Science	
ECTS Method of grading	Only after succ. com	pl. of module(s)		
5 numerical grade				
Duration Module level	Other prerequisites			
1 semester				
Contents				
Intended learning outcomes				
	-			
Courses (type, number of weekly conta	act hours, language —	if other than Germa	n)	
V (2) + Ü (2)				
Method of assessment (type, scope, la ster, information on whether module of	anguage — if other tha an be chosen to earn	an German, examina [.] a bonus)	tion offered — if not every seme-	
If announced by the lecturer at the beg examination of one candidate each (a prox. 15 minutes per candidate). creditable for bonus	ginning of the course, pprox. 20 minutes) or	the written examinat an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocation of places				
Additional information				
Workload				
150 h				
Teaching cycle				
Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 22 II Nr. 3 b)				
Module appears in				
Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)				
First state examination for the teaching First state examination for the teaching	Science (2025) g degree Realschule C g degree Gymnasium	025) computer Science (20 Computer Science (2	025) 2025)	

Module title				Abbreviation	
Modeling and Simulation					10-l-MuS-212-m01
Module coordinator				Module offered by	
holder	of the F	Professorship for modelin	g and simulation	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Modeling and simulation play a central role in computer science and in the natural sciences for the analysis of systems. The module includes basic modeling paradigms, basics of simulation (discrete, continuous, hybrid, parallel), its implementation and evaluation.					
Intende	ed learr	ning outcomes			
The stu on. The simulat	dents l y will a tion sce	earn the basics of variou cquire the skills to transl enarios with suitable soft	s modeling formalisn ate these systems in ware, and to carry ou	ns and types of simu to models for given p t and analyze simula	lations as well as their applicati- problems and tasks, to develop ation studies.
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Methoo ster, in	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written examination (approx. 60 to 120 minutes) if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). creditable for bonus					
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teaching cycle					
Teachir	ng cycle	e: every year, winter seme	ester		
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title			Abbreviation		
Natura	l Language Processing			10-I-NLP-222-m01	
Module	e coordinator		Module offered by		
holder	of the Chair of Computer Scie	nce XII	Institute of Comput	er Science	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
5	numerical grade				
Duratio	on Module level	Other prerequisites			
1 seme	ster undergraduate				
Introduction to Text Mining and Natural Language Processing; Traditional computational representations of text data (bag-of-words) and text preprocessing (sentence splitting, tokenization, morphological normalization, stemming); Corpus linguistics and lexical association measures (ngram frequencies, co-occurrences, collocations and terminology extraction); Syntactic analysis: Part-of-Speech tagging and chunking (with Hidden Markov Models and Conditional Random Fields), parsing (Probabilistic Context Free Grammars and parsers); Distributional semantics and latent text representations: distributional hypothesis, Latent Semantic Analysis (LSA), word embeddings; Light introduction to (modern) deep learning-based NLP: embeddings, convolutional and recurrent networks, Transformers. NLP Applications: text classification tasks (e.g., document classification, sentiment analysis) vs. token classification tasks (e.g., information extraction - named entity recognition) vs. text generation					
Intend	ed learning outcomes	·			
Students will obtain broad theoretical and practical knowledge of the typical methods and algorithms in the field of text mining and natural language processing. They will be able to solve practical problems with the obtain knowledge: analyze the text data for the task at hand, choose the appropriate representation for their texts as well as the appropriate (machine learning for NLP) model to solve the task. They will have gained rich practical experience implementing solutions for a wide range of common NLP tasks and applications.					
Course	s (type, number of weekly con	tact hours, language –	- if other than Germa	in)	
V (2) + Module	Ü (2) e taught in: German and/or En	glish			
Metho ster, in	d of assessment (type, scope, formation on whether module	language — if other th can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written If anno examir prox. 1 Langua credita	examination (approx. 60 to 1 unced by the lecturer at the b nation of one candidate each (5 minutes per candidate). age of assessment: German ar ble for bonus	20 minutes). eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examinatior	tion may be replace 1 in groups of 2 cand	d by an oral lidates (ap-
Allocat	ion of places				
Additio	onal information				
Workload					
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Bachel	or's degree (1 major) Mathema	atical Data Science (20	22)		
LA Gymnas	ien Computer Science (2025)	JMU Würzburg data record	g • generated 18-Jun-2025 • e Lehramt Gymnasien Informat	xam. reg. ik - 2025	page 137 / 171

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Games Engineering (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title				Abbreviation
Practical Course in Programming			10-I-PP-191-m01	
Module co	oordinator		Module offered by	
Dean of St	tudies Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS M	ethod of grading	Only after succ. com	pl. of module(s)	
10 (n	ot) successfully completed			
Duration	Module level	Other prerequisites		
	undergraduate	Intended learning ou GdP. It is therefore s	utcomes of the follow trongly recommende	ving module are required: 10-I- ed to complete this before.
Contents				
The progra	amming language Java. Indep	endent creation of sr	nall to middle-sized,	, high-quality Java programs.
Intended l	learning outcomes			
The stude	nts are able to independently	develop small to mi	ddle-sized, high-qua	lity Java programs.
Courses (t	type, number of weekly conta	ct hours, language —	if other than Germa	n)
P (6)				
Method of ster, inform	f assessment (type, scope, la mation on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
practical examination (programming exercises, approx. 240 hours) and written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate).				
Allocation	n of places			
Additiona	linformation			
Workload				
300 h				
Teaching	cycle			
Referred t	to in LPO I (examination regu	lations for teaching-c	legree programmes)	
§ 49 Nr. 1 § 69 Nr. 1	1 c) 1 d)			
Module appears in				
Bachelor's degree (1 major) Computer Science (2019) Module studies (Bachelor) Computer Science (2019) Module studies (Bachelor) Orientierungsstudien (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2021)				
Bachelor's	s degree (1 major) Computer S	Science and Sustaina	bility (2025)	

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Module title				Abbreviation	
Project Presentation			10-I-PV-252-m01		
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
2	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Presen sentati work-ir	tation o on for l 1-progre	of a project developed by aypersons with a knowle ess, is presented with the	the student (e.g. Ba dge of computer scie help of a poster, a s	chelor's thesis, soft nce at a trade fair. T hort talk and option	ware project) analogous to a pre- he project, which may also be ally a live demonstration.
Intende	ed lear	ning outcomes			
The stu	idents a	are able to present a proj	ect they developed a	nd to create the requ	uired media.
Course	s (type	, number of weekly conta	ct hours, language —	· if other than Germa	in)
S (3)					
Metho ster, in	d of ass formati	sessment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
Presen with di Langua credita	tation o scussio ige of a ble for	of a self-developed projec on (approx. 10-15 minutes ssessment: German and, bonus	tt analogous to a trad) /or English	le fair presentation f	or computer science laypersons
Allocat	ion of _l	olaces			
	_				
Additio	onal inf	ormation			
Workload					
60 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Bachel First sta	or's de ate exa	gree (1 major) Computer S mination for the teaching	Science (2025) g degree Gymnasium	Computer Science (2	2025)

Module title				Abbreviation			
Computer Architecture 10-I-RAK-152-m01							
Module coordinator				Module offered by			
Dean of Studies Informatik (Computer		Science)	Science) Institute of Computer Science				
ECTS	S Method of grading Only after succ. compl. of module(s)						
5	numerical grade						
Duratio	on Module lev	el	Other prerequisites				
1 seme	ester undergradu	uate					
Conter	its						
Instruction set architectures, command processing through pipelining, statical and dynamic instruction schedu- ling, caches, vector processors, multi-core processors.					tion schedu-		
Intend	ed learning outcom	es					
The stu compil	Idents master the m ers and operating s	nost importa systems.	nt techniques to desi	gn fast computers as	s well as their intera	ction with	
Course	s (type, number of	weekly conta	act hours, language –	- if other than Germa	ın)		
V (2) +	Ü (2)	,			,		
Metho	d of assessment (tv	ne. scope. la	nguage — if other th	an German, examina	ition offered — if not	everv seme-	
ster, in	formation on wheth	ner module c	an be chosen to earn	a bonus)			
written	examination (appr	0x. 60 to 120	o minutes).	the written evening	tion may be replaced	d hu an aral	
examir	nation of one candid	date each (ar	nning of the course,	an oral examination	in groups of 2 cand	idates (an-	
prox. 1	5 minutes per candi	idate).	· · · · · · · · · · · · · · · · · · ·				
Langua	age of assessment:	German and	/or English				
credita	ble for bonus		-				
Allocat	tion of places						
Additio	onal information						
			_				
Worklo	bad						
150 h							
Teachi	ng cycle						
Referre	ed to in LPO I (exam	nination regu	llations for teaching-	degree programmes)			
§ 22	Nr. 3 b)						
§6911	Nr. 1 c): Rechnerarch	hitektur					
Modul	e appears in						
Bachelor's degree (1 major) Computer Science (2015)							
Bachelor's degree (1 major) Mathematics (2015)							
Bachelor's degree (1 major) Computational Mathematics (2015)							
First state examination for the teaching degree Sympasium Computer Science (2015)							
Master's degree (1 major) Physics (2016)							
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
Bachelor's degree (1 major) Aerospace Computer Science (2017)							
Bachelor's degree (1 major) Computer Science (2017)							
Bachel	or's degree (1 majo	r) Computer	Science (2019)				
Master's degree (1 major) Physics (2020)							
LA Gymnas	sien Computer Science (202	5)	JMU Würzburg data record I	g • generated 18-Jun-2025 • e .ehramt Gymnasien Informati	xam. reg. ik - 2025	page 141 / 171	

Su	bdivided Module Catalogue for the Subject
	Computer Science
$\geq b$	LA Gymnasien

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Physics International (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Master's degree (1 major) Physics International (2024) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title					Abbreviation
Digital computer systems				10-I-RAL-252-m01	
Module coordinator				Module offered by	
Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Computer Science	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)		
10	10 numerical grade				
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Introduction to digital technologies, Boolean algebras, combinatory circuits, synchronous and asynchronous cir- cuits, hardware description languages, structure of a simple processor, machine programming, memory hierar- chy.					
Intende	ed learr	ning outcomes			
The students possess a knowledge of the fundamentals of digital technologies up to the design and program- ming of easy microprocessors as well as knowledge for the application of hardware description languages for the design of digital systems.					
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + I	Ü (2)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					tion offered — if not every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). creditable for bonus					
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 Nr. 3 b), § 69 Nr. 1 c)					
Module appears in					
Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title				Abbreviation		
Exam Tutorial for the German Staatsexamen				10-I-REP-152-m01		
Module coordinator				Module offered by		
Dean of Studies Informatik (Computer Science)			Science)	Institute of Computer Science		
ECTS Method of grading		Only after succ. compl. of module(s)				
4	(not) s	successfully completed				
Duration		Module level	Other prerequisites			
2 seme	ster	undergraduate				
Conten	ts					
Revisio	n of co	ntents of modules coveri	ng the subject as wel	l as the subject dida	ictics of computer science.	
Intende	ed learr	ning outcomes				
The stund	dents ł	nave refreshed their skills	s for the solution of th	ne type of problems	asked in the written state exami-	
Courses	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)	
Ü (2)						
Method ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
One exe	ercise p	per area covered in the st	ate examination			
Allocati	ion of p	olaces				
	•					
Additio	nal info	ormation				
Worklo	ad					
120 h						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
§ 22 Nr. 2 f) § 22 Nr. 3 b)						
Module appears in						
First state examination for the teaching degree Realschule Computer Science (2015)						
First state examination for the teaching degree Gymnasium Computer Science (2015)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Supplementary course MINT leacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
First state examination for the teaching degree Realschule Computer Science (2025)						
First state examination for the teaching degree Gymnasium Computer Science (2025)						
Thist state examination for the teaching degree dynnasidin computer science (2025)						
Module title			Abbreviation			
---	--	---	--	---	--	--
Introduction to Space Systems			10-I-RFS-172-m01			
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
History space a	of spa applica	ce flight, carrier rockets, c tions, foundations of sub	orbits of spacecraft, e osystems of spacecra	environment condition ft. Introduction to av	ons in space, special aspects of iation systems.	
Intende	ed lear	ning outcomes				
The stu correct culatio	Idents ly ident ns for s	possess the theoretical a tify the most important sy elected basic system ele	nd practical knowled /stem relationships, f ments.	ge necessary to corr formulate requireme	ectly classify aerospace systems, nts for new systems and do cal-	
Course	s (type	, number of weekly conta	ict hours, language —	· if other than Germa	n)	
V (2) +	Ü (1)					
Methoo ster, in	d of ass formati	essment (type, scope, la on on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If anno examin credita	examinunced ation control ble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap bonus	minutes) inning of the course, oprox. 30 minutes).	the written examina	tion may be replaced by an oral	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
	3 0,00	-				
Referre	d to in	IPOI (examination regu	lations for teaching-	legree programmes)		
8 22 11	Nr 2h)					
Module appears in						
Bachel	or's de	gree (1 major) Aerospace	Computer Science (2	017)		
Bachel	or's de	gree (1 major) Aerospace	Computer Science (2	.020)		
Bachel	or's de	gree (1 major) Computer S	Science and Sustaina	ibility (2021)		
Bachel	or's de	gree (1 major) Aerospace	Computer Science (2	.025)		
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)	
Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title			Abbreviation			
Computer Networks and Information Transmission 10-I-RIÜ-191-m01						
Module coordinator Module of			Module offered by	lle offered by		
holder of the Chair of Computer Science III			Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
 Computer networks and the Internet: Structure and Mechanisms of Telecommunication Communication Protocols: Basic Principles and the Layer Model Computer and Communication Systems: Network Systems, Data Traffic in Distributed Systems and inter-network Communication The Internet: Important Protocols and Routing Architecture and Structure of Computer Networks: Network Architecture, Access Mechanisms, Flow Control and Traffic Management Coding Theory: Mechanisms for Error Detection and Error Correction Information Theory: Entropy of Data Digital Communication Systems: Signal Modulation 						
Studen puter n	ts com etwork	mand the technical, the s, the Internet and comr	oretical as well as pra nunication systems fo	ctical knowledge to u	understand the struc	ture of com-
Course	s (type.	number of weekly cont	act hours. language –	- if other than Germa	n)	
V (4) +	Ü (2)	,			,	
Method	d of ass formati	essment (type, scope, l	anguage — if other the	an German, examina	tion offered — if not	every seme-
written If anno examin prox. 19 credita	examir unced l ation o 5 minut ble for	nation (approx. 60 to 120 by the lecturer at the beg f one candidate each (a es per candidate). bonus	o minutes). ginning of the course, pprox. 20 minutes) or	the written examina an oral examination	tion may be replaced in groups of 2 candi	d by an oral idates (ap-
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 Nr. 3 b), § 69 Nr. 1 c)						
Module appears in						
Bachelor's degree (1 major) Computer Science (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Bachelor's degree (1 major) Aerospace Computer Science (2020) Bachelor's degree (1 major) Computer Science and Sustainability (2021) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)						
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Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Mathematics (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

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Module title					Abbreviation
Control Principles of Modern Communication Systems				10-I-RK-212-m01	
Module	e coord	inator		Module offered by	
holder	of the O	Chair of Computer Scienc	e III	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
The mo stems, in curre on to tr	dule te central ent broa affic th	aches control principles and distributed mechan adband and home access eory are given.	in the Internet, in cor isms for control and o networks. Simple m	nputer networks and data exchange, arch ethods of assessing	I modern communication sy- itecture and basic mechanisms performance and an introducti-
Intende	ed leari	ning outcomes			
The stu cation s ments.	dents l system They a	nave extensive knowledg s and can apply the know lso get to know basic me	e of the structure, arc vledge to evaluate the thods for theoretical	hitecture and contro e systems and proto analysis.	ol principles of modern communi- cols in simulations and measure-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Method ster, in	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written if anno examin prox. 19 Langua credita	examin unced ation o 5 minut ge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap res per candidate). ssessment: German and, bonus	minutes) inning of the course, oprox. 20 minutes) or /or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Teaching cycle: every year, winter semester					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Bachel First sta Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2021) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)				

Module title Abbreviation					Abbreviation	
Practica	al Train	ing in Classroom Teachi	ng in Computer Scier	ce Education inclu-	10-I-SBFD-GY-152-m01	
ding Th	ding Theory (German Gymnasium)					
Module	coordi	inator		Module offered by		
Dean of	Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
Content	s					
The mod	dule in	troduces students to the	classroom practice o	of their <i>Unterrichtsfa</i>	ch (subject studied with a focus	
on the s	scientif	ic discipline). Using spec	ific teaching models,	, examples and proje	ects in different grades, the mo-	
dule int	roduce	es students to subject-sp	ecific techniques. In t	the university course	e accompanying the placement,	
student	s reneo	ct and structure the scho	didactic aspects. In	this context, the cou	their teaching placements and	
	ects of	teaching computer scien	ce in accordance with	h applicable guidelir	nes and curricula. The course fo-	
cuses o	n recer	nt developments in class	room practice, also ta	aking into account a	spects of school pedagogy and	
learning	g psych	iology that can support th	ne successful practic	al implementation o	f subject-specific conceptual de-	
signs.						
Intende	d learr	ning outcomes				
The stud	dents a	are familiar with the most	important componei	nts of planning and o	organising classes. They are ab-	
le to tea	ich the	relevant topics in differe	ent grades as well as t	to critically reflect re	cent developments in education.	
They are	e able t	to connect ideas from scl	nool pedagogy and le	arning psychology w	vith their expertise in the area of	
didactic	s and	to incorporate these into	their teaching.		```	
Courses	s (type,	, number of weekly conta	ct hours, language —	f other than Germa	n)	
P (o) + S	5 (2)	· · ·				
Method	of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-	
ster, Inf	ormati		an be chosen to earn	a bonus)		
Written	elabor	ation of teaching practice	e (15 to 20 pages)	a . Cubaatian . Can		
regulati	.s anu i ons foi	r teaching-degree program	mmes). narticipation	in mandatory teach	ing practice, completion of all set	
tasks as	s speci	fied by placement schoo	l.	in manualory teach	ing practice, completion of all set	
Allocati	on of p	olaces				
Additio	nal info	ormation				
Workloa	ad					
120 h						
Referred to in IPO I (examination regulations for teaching degree programmes)						
§ 34 1	Nr. 4					
Module	Module appears in					
First sta	te exai	mination for the teaching	degree Gymnasium	Educational Science	(2015)	

LA Gymnasien	Computer Science	(2025)	
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Module title			Abbreviation			
Software Engineering					10-I-SE-252-m01	
Module	e coord	inator		Module offered by		
				Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster					
Conten	ts					
Intende	ed learı	ning outcomes				
Course	s (type	, number of weekly conta	ict hours, language —	if other than Germa	n)	
V (2) +	Ü (2)	· · · · ·				
Methoo ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
If anno examin prox. 19 credita	examin unced nation o 5 minut ble for	hation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap res per candidate). bonus	inning of the course, pprox. 20 minutes) or	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	onal info	ormation	·			
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)		
§ 49 N § 69 N	§ 49 Nr. 1 b) § 69 Nr. 1 b)					
Module appears in						
Bachelor's degree (1 major) Economathematics (2025) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Aerospace Computer Science (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Realschule Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Pachelor's degree (1 major) Computer Science and Sustainability (2027)						
Dachel	Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title				Abbreviation		
Semina	Seminar - Selected Topics in Computer Science 1 10-I-SEM1-152-m01					
Module coordinator Module offered b			Module offered by			
Dean of Studies Informatik (Computer Science)			Institute of Comput	er Science		
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5	numer	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Indepe ware w rent are	ndent r ith writi eas (thi	eview of a current topic ten and oral presentati s usually means that th	in computer science on. The topics in modu ey are assigned by dif	on the basis of literat les 10-I-SEM1 and 10 ferent lecturers).	ture and, where appl p-I-SEM2 must come	icable, soft- from diffe-
Intende	ed learr	ning outcomes				
The stu aspects	dents a s in writ	are able to independen ten form and to orally	tly review a current top present these in an app	ic in computer scien propriate way.	ce, to summarise the	e main
Course	s (type,	number of weekly con	tact hours, language –	- if other than Germa	n)	
S (2)		·				
Method ster, in	l of ass formati	essment (type, scope, on on whether module	language — if other tha can be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
written cussior	elabora 1 on a te	ation (approx. 10 to 15 opic from the field of co	bages) and presentation presentation presentation presentation presentation presentation presentation of the second s	on (approx. 30 to 45 i	minutes) with subse	quent dis-
Langua	ge of a	ssessment: German an	d/or English			
Allocat	ion of p	laces				
Additio	nal info	ormation				
Worklo	ad					
150 h						
Teachi	ng cycle	9				
Poforro	d to in	IPOL (examination reg	ulations for teaching	legree programmes)		
C						
9 22 11 1	vr. 3 D)					
Module	e appea	rsin				
Bachel	or's deg	gree (1 major) Compute	r Science (2015)	× 、		
Bachel	or's deg	gree (1 major) Business	Information Systems ((2015)	,	
First sta	ate exai	mination for the teachi	ng degree Gymnasium	Computer Science (2	2015)	
Bachel	or's deg	gree (1 major) Business	Information Systems (2016)		
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course while reacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Dachelor's degree (1 major) Computer Science (201/) Bachelor's degree (1 major) Computer Science (2010)						
Bachelor S degree (1 major) Computer Science (2019)						
Bachel	or's deg	aree (1 maior) Rusiness	Information Systems (2010)		
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS Elite Network Ravaria (ENR) (2020)					
Supplementary course MINT Teacher Education PLUS, Elite Network Bayaria (ENB) (2020)						
Bachel	or's des	ree (1 maior) Business	Information Systems	(2020)	,,	
Bachel	or's deg	gree (1 major) Compute	r Science and Sustaina	ability (2021)		
LA Gymnas	ien Compu	iter Science (2025)	JMU Würzburg	g ● generated 18-Jun-2025 ● e	xam. reg.	page 151 / 171
			data record l	ehramt Gymnasien Informati	k - 2025	

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Bachelor's degree (1 major) Business Information Systems (2021) Bachelor's degree (1 major) Business Information Systems (2023) Bachelor's degree (1 major) Business Information Systems (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)

LA Gymnasien Computer Science (2025) JMU Würzburg • generated 18-Jun-2025 • exam. reg. page 152 / 171 data record Lehramt Gymnasien Informatik - 2025

Module title			Abbreviation			
Statist	Statistical Network Analysis 10-I-SNA-222-m01					
Modul	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e XV	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Durati	on	Module level	Other prerequisites	6		
1 seme	ester	undergraduate				
Conter	nts					
Networks matter! This holds for technical infrastructures like communication or transportation networks, for in- formation systems and social media in the World Wide Web, but also for various social, economic and biologi- cal systems. What can we learn from data that capture the interaction topology of such complex systems? What is the role of individual nodes and how can we discover significant patterns in the structure of networks? How do these structures influence dynamical process like diffusion or the spreading of epidemics? Which are the most influential actors in a social network? And how can we analyse time series data on systems with dynamic net- work topologies? Addressing those questions, the course combines a series of lectures - which introduce fundamental concepts for the statistical modelling of complex networks - with weekly exercises that show how we can apply them to practical network analysis tasks. Topics covered include foundations of graph theory, centrality and modulari- ty measures, aggregate statistical characteristics of large networks, random graphs and statistical ensembles of complex networks, spectral analysis, as well as the modelling of time-varying networks. The course material appreciate of anottated elides for lectures are used as a secompanying rite Paraging networks. The course material						
Intend	ed lear	ning outcomes		The lectures.		
The co ven mo titative terns. very la dersta distrib dom p	The course will equip participants with statistical network analysis techniques that are needed for the data-driven modelling of complex technical, social, and biological systems. Students will understand how we can quantitatively model the topology of networked systems and how we can detect and characterize topological patterns. Participants will learn how to use analytical methods to make statements about the expected properties of very large networks that are generated based on different stochastic models. They further gain an analytical understanding of how the structure of networks shapes dynamical processes, how statistical fluctuations in degree distributions influence the robustness of systems, and how emergent network features emerge from simple ran-					
Course	es (type	, number of weekly conta	ict hours, language –	- if other than Germa	n)	
V (2) + Modul	Ü (2) e taugh	t in: German and/or Engl	ish			
Metho ster, ir	d of ass Iformati	sessment (type, scope, la on on whether module ca	inguage — if other th an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus						
Allocation of places						
Additi	onal inf	ormation				
L						

Workload

150 h

Teaching cycle

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Mathematical Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)

First state examination for the teaching degree Gymnasium Computer Science (2025)

LA Gymnasien Computer Science (2025)	JMU Würzburg • generated 18-Jun-2025 • exam. reg.	page 154 / 171
	data record Lehramt Gymnasien Informatik - 2025	

Module title				Abbreviation	
Practical course in software					10-I-SWP-252-m01
Module coordinator				Module offered by	
Dean of	f Studie	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	(not) s	successfully completed	10-I-PP, 10-I-SE		
Duratio	n	Module level	Other prerequisites		
1 seme:	ster	undergraduate	In addition, the know required. Prior atten ded.	wledge and skills ac dance of this modul	quired in module 10-I-ADS are e is therefore highly recommen-
Conten	ts				
Comple cation o tion and	etion of of solut d delive	a project assignment in ion components (e. g. U/ ery of the runnable softw	groups, problem ana ML) and milestones, ı are product in a collo	lysis, creation of req user manual, prograr quium.	uirements specifications, specifi- nming documentation, presenta-
Intende	ed leari	ning outcomes			
The stu small te	dents µ eams.	possess the practical skil	ls for the design, dev	relopment and execu	ition of a software project in
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)
P (6)					
Methoo ster, inf	l of ass formati	e ssment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
practica sentatio	al proje on (app	ect (Completion of a large prox. 10 minutes per grou	r software project in ; p)	groups (approx. 300	hours per person) and final pre-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachir	ıg cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 69 Nr. 1 d)					
Module appears in					
Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025) Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title			Abbreviation			
Theory	Theory of Computation 10-I-TI-242-m01					
Module	e coordi	inator		Module offered by		
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	numer	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Compu guages	tability , conte	, decidability, countabilit xt-sensitive languages, c	ty, finite automata, re omplexity of calculat	gular sets, generativ ions, P-NP problem,	/e grammars, context-free lan- NP completeness.	
Intende	ed learr	ning outcomes	,			
The stu tability comple	dents p , finite a exity of (oossess a fundamental a automata, regular sets, g computations, P-NP prob	nd applicable knowle enerative grammars, lem, NP completenes	edge in the areas of a context-free languag ss.	computability, decidability, coun- ges, context-sensitive languages,	
Course	s (type,	, number of weekly conta	ct hours, language —	· if other than Germa	n)	
V (4) +	Ü (2)					
Metho ster, in	d of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
If anno examin prox. 19 credita	unced b ation o 5 minut ble for l	by the lecturer at the beg f one candidate each (ap es per candidate).	inning of the course, oprox. 20 minutes) or	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	onal info	ormation				
Worklo	ad					
300 h						
Teachi	ng cycle	2				
	<u> </u>	-				
Referre	d to in	IPOI (examination regu	lations for teaching-	legree programmes)		
8 40 L						
§ 69 I N	vr. 1 a)					
Module	e appea	rs in				
Module	e studie	s (Bachelor) Orientierung	gsstudien (2020)			
Bachel	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)					
Master	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)					
Supple	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)					
Bachel	or's deg	gree (1 major) Games Eng	gineering (2025)	,		
Bachel	or's deg	gree (1 major) Aerospace	Computer Science (2	.025)		
Bachel	or's deg	gree (1 major) Computer S	Science (2025)			
First sta	ate exai	mination for the teaching	degree Realschule C	omputer Science (20	025)	
FIRST Sta	ate exai	mination for the teaching	g degree Gymnasium	Computer Science (2	2025)	
Bachel		gree (1 major) Computer S	Science and Sustaina	ionity (2025)		

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	data record Lehramt Gymnasien Informatik - 2025	

Module title				Abbreviation	
Theory of Machine Learning				10-I-TML-222-m01	
Module	e coord	inator		Module offered by	
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade		•	
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Intende	ed learı	ning outcomes			
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Methoo ster. inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
examin prox. 15 Langua credital	ation o 5 minut ge of a ble for	by the lecturer at the beg if one candidate each (ap ies per candidate). ssessment: German and, bonus	oprox. 20 minutes) or /or English	an oral examination	in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
§ 22 II Nr. 3 b)					
Module appears in					
Bachelor's degree (1 major) Mathematical Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023) Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024) Bachelor's degree (1 major) Games Engineering (2025) Bachelor's degree (1 major) Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)					
Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2025)				

Module title					Abbreviation	
Tutor activity 1					10-I-TUT1-152-m01	
Module	e coord	inator		Module offered by		
Dean of	fStudi	es Informatik (Computer	Science)	Institute of Compute	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
<u> </u>		undergraduate				
Conten	ts		· ·			
Tutorin	g activi	ities in the area of compu	ter science.			
Intende	ed lear	ning outcomes				
Imparti	ng kno	wledge and skills to stud	ents of computer scie	ence.		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
T (2)						
Methoo ster, in	l of ass formati	sessment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	in German, examina a bonus)	tion offered — if not every seme-	
Wrap-u	p repo	rt on tutoring activities (5	to 10 pages)			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
60 h						
Teachir	ıg cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
§ 22	Nr. 2 f)					
§ 22	vr. 3 f)	•				
Module	e appea	ars in	~ · · ()			
Bachelo First sta	or's de	gree (1 major) Computer S mination for the teaching	Science (2015) Aggree Realschule (omputer Science (20	215)	
First sta	ate exa	mination for the teaching	degree Gymnasium	Computer Science (20	2015)	
Bachel	or's de	gree (1 major) Computer S	Science (2017)			
Bachelor's degree (1 major) Computer Science (2019)						
Bachel	or's de	gree (1 major) Computer S	Science and Sustaina	bility (2021)		
Bachel	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)					
Bachel	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)					
Bachel	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)					
Bachel	or's de	gree (1 major) Computer S	Science (2025) Adograd Pasischula C	omputor Science (a	225)	
First sta	ate exd ate exa	mination for the teaching	, degree Gymnasium (Computer Science (20	940) 9025)	
Bachel	or's de	gree (1 major) Computer S	Science and Sustaina	bility (2025)	ر <u>-</u> >-	

Module title				Abbreviation		
Tutor activity 2			10-I-TUT2-152-m01			
Module	coord	inator		Module offered by		
Dean of	fStudi	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
2	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
		undergraduate				
Conten	ts		· · ·			
Tutoring	g activi	ties in the area of compu	iter science.			
Intende	ed lear	ning outcomes				
Imparti	ng kno	wledge and skills to stud	ents of computer scie	ence.		
Courses	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
T (2)						
Method ster, inf	l of ass formati	s essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	in German, examina a bonus)	tion offered — if not every seme-	
Wrap-u	p repo	rt on tutoring activities (5	to 10 pages)			
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
60 h						
Teachir	ng cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		
§ 22 N	Nr. 2 f)					
§ 22	Vr. 3 f)					
Module	appea	irs in				
Bachelo	or's de	gree (1 major) Computer S	Science (2015) Adagree Dealachule C	amputar Science (a		
FIISL SLC	ite exa	mination for the teaching	g degree Realschule C	Computer Science (20	J15) 2015)	
Bachelo	or's de	gree (1 major) Computer (Science (2017)			
Bachelor's degree (1 major) Computer Science (2019)						
Bachelo	or's de	gree (1 major) Computer S	Science and Sustaina	bility (2021)		
Bachelo	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)					
Bachelo	or's de	gree (1 major) Artificial In	telligence and Data S	cience (2023)		
Bachelo	Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)					
Bachelo	or's de	gree (1 major) Computer S	Science (2025)	omputor Colores (
First Sta	ite exa	mination for the teaching	g uegree kealschule C	Computer Science (20	J25)	
Bachelo	or's de	gree (1 major) Computer (Science and Sustaina	bility (2025)	.02)	
	Dachelor's degree (I major) computer Science and Sustamability (2025)					

Module title				Abbreviation		
Autono	Autonomous Mobile Systems 10-LURI=AMS-232-m01					m01
Modul	e coordinator			Module offered by		
holder	of the Chair of Computer S	Science	e XVII	Institute of Comput	er Science	
ECTS	Method of grading		Only after succ. con	npl. of module(s)		
10	numerical grade					
Duratio	on Module level		Other prerequisites			
1 seme	ester graduate					
Conter	nts					
(1) Wha on (6) trol arc	(1) What are mobile robots? (2) Sensors (3) Sensor data processing (4) Locomotion and kinematics (5) Localizati- on (6) Localization in maps (7) Mapping and SLAM (8) Navigation (9) Sensor data interpretation (10) Robot con- trol architectures					
Intend	ed learning outcomes					
Studer cepts t ve lear	nts know Bayesian concep to mobile robots. Derived on ned the steps to build and	ots for s concep d progra	ensor data processi Its like Kalman filter, am mobile systems.	ng for a mobile syste Particle filter, POMD	m and are able to ap Ps, etc. are understo	oply the con- ood. They ha-
Course	es (type, number of weekly	/ conta	ct hours, language —	- if other than Germa	n)	
V (4) + Modul	Ü (2) e taught in: German and/c	or Engli	sh			
Metho ster, in	d of assessment (type, sco formation on whether mo	ope, la dule ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not	every seme-
lf anno examir prox. 1 Langua credita	ounced by the lecturer at the nation of one candidate ea 5 minutes per candidate). age of assessment: Germa Ible for bonus	ne begi ach (ap in and/	prox. 20 minutes) or 'or English	the written examination	tion may be replaced in groups of 2 cand	d by an oral idates (ap-
Allocat	tion of places					
Additio	onal information					
Focuse KI, ES,	es available for students o LR, GE	f the M	aster's programme l	nformatik (Computer	r Science, 120 ECTS o	credits): IT,
Worklo	bad					
300 h						
Teachi	ng cycle					
Teachi	ng cycle: every year, sumn	ner sen	nester			
Referre	ed to in LPO I (examinatio	n regul	lations for teaching-o	degree programmes)		
§ 22	Nr. 3 b)					
Module appears in						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Aerospace Computer Science (2023)						
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)						
Master's degree (1 major) Antificial Intelligence (2024) Master's degree (1 major) Computational Mathematics (2024)						
Master's degree (1 major) Mathematics (2024)						
Master	r's degree (1 major) Compu	uter Sci	ience (2025)			
Master	r's degree (1 major) Aerosp	bace Co	omputer Science (20)	25)		
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	data record Lehramt Gymnasien Informatik - 2025	

Module title				Abbreviation	
Photogrammetric Machine Vision			10-LURI=PHOTO-232-mo1		
Module	e coord	inator		Module offered by	
holder	of the (Chair of Computer Scienc	e XVII	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
(1) Wha Transfo rect (10 Corresp	at is Ph orm (6) o) Iterat oonding	otogrammetry? (2) Camer Spatial Resection (7) Rela ive-Solution (11) Triangul g Points (16) Matching	ras (3) Homogeneous ative Orientation and ation (12) Multiview (Coordinates (4) Can Fundemental Matrix 13) Aerial photograp	nera Parameter (5) Direct Linear (8) Epipolar Geometry (9) FE-di- hy (14) Orthophoto (15) Finding
Intende	ed lear	ning outcomes			
Studen calcula ter visio	its und ite 3D ii on.	erstand that photogramm nformation from 2D imag	etry means measurir es and are able to eva	ng in and with photo aluate accuracies. Th	s. They have learned the steps to ne know the limits of 3D compu-
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Module	Ü (2) e taugh	t in: German and/or Engl	ish		
Metho ster, in	d of ass formati	sessment (type, scope, la ion on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written If anno examin prox. 19 Langua credita	examin unced nation c 5 minut uge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap tes per candidate). ssessment: German and, bonus	minutes) inning of the course, oprox. 20 minutes) or /or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of _l	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	Teaching cycle				
Teaching cycle: every year, winter semester					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Master's degree (1 major) Aerospace Computer Science (2023)					
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)					
Master	's degr	ee (1 major) Artificial Inte	lligence (2024)		
Master	's degr	ee (1 major) Aerospace Co	omputer Science (202	25) Computer Colores (
First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title					Abbreviation	
Roboti	Robotics 1 10-LURI=R01-232-m01					
Module	e coord	nator		Module offered by		
holder	of the C	Chair of Computer Scier	nce XVII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	numei	rical grade				
Duratio	on ster	Module level	Other prerequisites			
Conten	ts	Siddute				
ContentsHistory, applications and properties of robots, direct kinematics of manipulators: coordinate systems, rotations, homogenous coordinates, axis coordinates, arm equation. Inverse kinematics: solution properties, end effec- tor 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 inver- 						
Allocat	ion of p	laces				
Additio	onal info	ormation				
Focuse ES, LR,	s availa HCI, GE	ble for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits): KI,
Worklo	ad					
150 h						
Teachi	ng cycl	9				
Teaching cycle: every year, winter semester						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Master Master Master Master Master	Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Aerospace Computer Science (2023) Master's degree (1 major) Artificial Intelligence & Extended Reality (2024) Master's degree (1 major) Artificial Intelligence (2024) Master's degree (1 major) Computational Mathematics (2024)					
			data record l	Lehramt Gymnasien Informati	k - 2025	

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Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025)

First state examination for the teaching degree Gymnasium Computer Science (2025)

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	data record Lehramt Gymnasien Informatik - 2025	1

Module title				Abbreviation		
Robotics 2 10-LURI=R02-232-mo1						
Modul	e coord	inator		Module offered by		
holder	of the C	Chair of Computer Scier	nce XVII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	numei	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	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, in- itialising, application examples, problems of Kalman filters, extended Kalman filter.						
Intend	ed learr	ning outcomes				
The stu tions o se the design	idents r f roboti connect . They a	naster all fundamental cs. The students posse tions between the dual Ilso recognise the relati	s that are necessary to ss a knowledge of adv pairs controllability - c onship between the Ka	understand Kalman anced controller and observability as well alman filter as a state	filters and their use observer methods a as controller design e estimator and an o	in applica- and recogni- and observer bserver.
Course	s (type,	, number of weekly con	tact hours, language –	- if other than Germa	n)	
V (4) + Module	Ü (2) + e taught	P (1) t in: German and/or En	glish			
Metho	d of ass	essment (type scope	language — if other th	an German, examina	tion offered — if not	everv seme-
ster, in	formati	on on whether module	can be chosen to earn	a bonus)		
written If anno examir prox. 1 Langua	examir unced l nation o 5 minut age of a ble for	nation (approx. 60 to 12 by the lecturer at the be f one candidate each (es per candidate). ssessment: German an bonus	eo minutes) eginning of the course, approx. 20 minutes) or d/or English	the written examina an oral examination	tion may be replaced in groups of 2 candi	d by an oral idates (ap-
Allocat	ion of r					
πιισται		haces				
Additio	onal info	ormation				
Focuse ES, LR,	s availa HCI, GE	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS c	redits): KI,
Worklo	ad					
300 h						
Teachi	ng cycl	9				
Teachi	ng cycle	e: every year, summer s	emester			
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)		
§ 22 II Nr. 3 b)						
Module appears in						
Master's degree (1 major) Computer Science (2023)						
Master's degree (1 major) Aerospace Computer Science (2023)						
Master's degree (1 major) Artificial Intelligence & Extended Reality (2024)						
Master's degree (1 major) Artificial Intelligence (2024)						
Master's degree (1 major) Computational Mathematics (2024)						
Master	's degre	ee (1 major) Mathemati	cs (2024)			
Master	's teach	ning degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	025)
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Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Subdivided Module Catalogue for the Subject Computer Science LA Gymnasien

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Computer Science (2025) Master's degree (1 major) Aerospace Computer Science (2025) First state examination for the teaching degree Gymnasium Computer Science (2025)

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Module title			Abbreviation		
Satellite Image processing				10-LURI=SBV-232-m01	
Module	e coordi	inator		Module offered by	
holder	of the C	Chair of Computer Science	e VIII	Institute of Compute	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	numei	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Intende	ed learr	ning outcomes			
Course	s (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (4) + I Module	Ü (2) e taught	t in: German and/or Engli	ish		
Methoo ster, inf	l of ass formati	essment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written If annoi examin prox. 15 Langua credital	examir unced l ation o 5 minut ge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg f one candidate each (ap es per candidate). ssessment: German and/ bonus	minutes) inning of the course, prox. 20 minutes) or /or English	the written examinat an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachir	ng cycl	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 II Nr. 3 b)					
Module appears in					
Master's degree (1 major) Aerospace Computer Science (2023)					
Master'	s degre	ee (1 major) Aerospace Co	omputer Science (202	25)	
First state examination for the teaching degree Gymnasium Computer Science (2025)					

Module title				Abbreviation		
Spacecraft System Analysis 10-LURI=SSA-232-m01					10-LURI=SSA-232-m01	
Module coordinator				Module offered by		
holder	of the (Chair of Computer Science	e VIII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade		•		
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Introduction: history of space flight, system design of spacecraft. Space dynamics: two-body dynamics, Kepler orbits, disturbance forces, transfer orbits. Mission analysis: earth and sun-synchronous orbits, shadows, solar angle of incidence. Thermal control of satellites: thermal analysis, thermal design and technologies, verification of thermal designs. Telecommunication: ground contact analysis, data transmission, satellite monitoring (telemetry, telecommando). Structure and mechanisms. Energy systems: primary, secondary, management, power generation: solar cells. On-board data processing. Propulsion systems. Tests (mechanical, electrical). Operation of spacecraft. Ground segment						
Intend	ed lear	ning outcomes				
The stu jor sub	udents i osystem	master system aspects of s and their integration in	the layouting of tech to a working whole a	nnical systems. Using re being analysed.	g the example of spacecraft, ma-	
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	in)	
V (4) + Modul	Ü (2) e taugh	t in: English				
Metho	d of ass	sessment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-	
written examination (approx. 60 to 120 minutes) If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: English creditable for bonus						
Allocation of places						
Additi	onal inf	ormation				
Focuse	Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): ES,					
Worklo	bad					
300 h	-					
Teachi						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Maste	Master's degree (1 major) Computer Science (2023)					
Master's degree (1 major) Aerospace Computer Science (2023)						
Master's degree (1 major) Computer Science (2025)						
Master's degree (1 major) Aerospace Computer Science (2025)						
First state examination for the teaching degree Gymnasium Computer Science (2025)						

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Module title			Abbreviation			
Hardwa	Hardware-oriented programming and Fundamentals Avionics 10-LURI-HWZ-252-mo		10-LURI-HWZ-252-m01			
Module	e coord	inator		Module offered by		
				Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	mpl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester						
Conten	Its					
Intend	ed lear	ning outcomes				
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
V (4) +	Ü (2) +	P (2)				
Metho ster, in	Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					
written examination (approx. 120 minutes) and practical examination in form of approx. 6 programming exerci- ses (approx. 4 hours each), weighted 1:1 creditable for bonus						
Allocation of places						
Additio	onal inf	ormation				
Worklo	ad					
300 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						
Module appears in						
Bachelor's degree (1 major) Aerospace Computer Science (2025)						
First st	First state examination for the teaching degree Gymnasium Computer Science (2025)					
Bachel	Bachelor's degree (1 major) Computer Science and Sustainability (2025)					

Module title				Abbreviation	
Digital media 1 10				10-MK-DigMed1-212-m01	
Module coordinator				Module offered by	
holder of the Professorship of Media Informatics			formatics	Institute of Human	Computer Media
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate		undergraduate			
Content	S				
The development of multimedia and multimodal media for the presentation of information has fundamentally transformed the way computers and media are used within few years. Since digital media is created on the computer but consumed by humans, media informatics needs to focus on technology as well as humans. The module aims to provide fundamental knowledge of digitization and coding as well as the basic functionalities of digital media types such as audio images. 2D vector graphics and texts					
Intende	d learr	ning outcomes			
Student various and pra	Students acquire a basic knowledge of human perception as well as the digitization, compression and editing of various digital media types. In the accompanying tutorials, the contents of the lecture are deepened, practiced and practically applied.				
Courses	i (type,	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + Ü	Ĵ (2)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					
a) written examination (approx. 50 minutes) or b) oral examination of one candidate each (approx. 20 minutes) Language of assessment: German and/or English creditable for bonus					
Allocation of places					
Addition	nal info	ormation			
Instead	Instead of an exercise, a tutorial with 2 SWS can be offered.				
Workloa	Workload				
150 h					
Teaching cycle					
	<u> </u>				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 N	§ 22 Nr. 3 h)				
Module	Module appears in				
Bachelo	Bachelor's degree (1 major) Media Communication (2021)				
First sta	First state examination for the teaching degree Gymnasium Computer Science (2025)				

Module title				Abbreviation	
Digital media 2 10-MK-DigMed2-212-				10-MK-DigMed2-212-m01	
Module coordinator				Module offered by	
holder of the Professorship of Media Informatics			formatics	Institute of Human	Computer Media
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate					
Conten	ts				
The lecture Media Informatics 2 provides a practice-oriented insight into the functioning of the Internet and the WWW, as well as the basics of developing and designing digital online media. Additional digital media types are introduced, based on the lecture Media Informatics 1. At the end of the module research topics in Media Informatics will be introduced and presented in an app- lied-practical way.					
Intende	ed learı	ning outcomes			
The students have a deeper insight into selected media types. In addition, digital media can be developed (for the WWW) using various processes. In the accompanying tutorials the contents of the lecture are deepened, practiced and applied practically.					
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) +	Ü (2)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)					
a) written examination (approx. 100 minutes) or b) oral examination of one candidate each (approx. 30 minutes) Language of assessment: German and/or English creditable for bonus					
Allocation of places					
Additio	nal inf	ormation			
Worklo	Workload				
300 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
§ 22 Nr. 3 b)					
Module appears in					
Bachelor's degree (1 major) Media Communication (2021) First state examination for the teaching degree Gymnasium Computer Science (2025)					

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