

Module Catalogue for the Subject

Computer Science

as a Master's with 1 major with the degree "Master of Science" (120 ECTS credits)

Examination regulations version: 2016 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Computer Science

JMU Würzburg • generated 19-Apr-2025 • exam. reg. data record 88|079|-|-|H|2016



Contents

The subject is divided into		4
Learning Outcomes		5
6	tions, Notes, In accordance with	6
Compulsory Courses		8
Seminar 1 - Current Topics in Com	puter Science	9
Seminar 2 - Current Topics in Com		10
Practical course - Current Topics ir	•	11
Compulsory Electives		12
3D Point Cloud Processing		13
Operating Systems		14 14
Data Mining		15
Databases		16
Databases 2		18
Interactive Computer Graphics		19
Computational Complexity		21
Cryptography and Data Security		22
Advanced Programming		23
Object oriented Programming		25
Computer Architecture		26
Computer Networks and Communi	cation Systems	27
Knowledge-based Systems		29
Project - Current Topics in Comput	er Science	30
Advanced Automation		31
Algorithms for Geographic Informa	tion Systems	33
Computational Geometry		35
Approximation Algorithms		37
Automata Theory		39
Avionics Systems		41
Multimodal User Interfaces		43
Computability Theory		45
Bioinformatics		47
Compiler Construction Deductive Databases		49
E-Learning		51
Introduction into Human-Compute	r Interaction	52
Embedded Systems		54 56
Analysis and Design of Programs		58
Information Retrieval		60
3D User Interfaces		62
Computational Complexity II		64
Artificial Intelligence 1		66
Artificial Intelligence 2		68
Performance Evaluation of Distribu	ited Systems	70
Mathematical Logic		72
Medical Informatics		74
Performance Engineering & Bench	marking of Computer Systems	76
Professional Project Management		78
Computer Arithmetic		80
Robotics 1		82
Robotics 2		84
Discrete Event Simulation		86
Real-Time Interactive Systems		88
Software Architecture		90
Master's with 1 major Computer Science (2016)	JMU Würzburg • generated 19-Apr-2025 • exam.	page 2 / 119
	reg. data record Master (120 ECTS) Informatik - 2016	



Spacecraft System Design	92
Machine Learning (for User Interfaces)	93
Visualization of Graphs	95
Interactive Computer Graphics	97
Space Systems Design	99
Design of Planetary Bases and Orbital Stations	100
Practical course - Rocket Engineering and Payloads	101
Selected Topics in Algorithms	102
Selected Topics in Theory	104
Selected Topics in Software Engineering	106
Selected Topics in Internet Technologies	107
Selected Topics in Intelligent Systems	109
Selected Topics in Embedded Systems	110
Selected Topics in Aerospace Engineering	111
Selected Topics in HCI	113
Selected Topics in Computer Science	114
NLP and Text Mining	115
Thesis	117
Concluding Colloquium Computer Science	118
Master's Thesis Computer Science	119



The subject is divided into

section / sub-section	ECTS credits	starting page
Compulsory Courses	20	8
Compulsory Electives	70	12
Thesis	30	117

Master's with 1 major Computer Science (2016)	
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UNIVERSITÄT WÜRZBURG

Learning Outcomes

German contents and learning outcome available but not translated yet.

Wissenschaftliche Befähigung

- Die Absolventinnen und Absolventen können erweiterte mathematische, technische, theoretische und praktische Konzepte der Informatik anwenden.
- Die Absolventinnen und Absolventen können tiefergehende Kenntnisse in mindestens einem Teilgebiet abrufen.
- Die Absolventinnen und Absolventen können fortgeschrittene hard- und/oder softwaregetriebene Experimente durchführen, analysieren, auswerten und die erhaltenen Ergebnisse darstellen.
- Die Absolventinnen und Absolventen sind in der Lage, sich mit Hilfe von Fachliteratur in neue Aufgabengebiete einzuarbeiten und die Ergebnisse zu interpretieren und zu bewerten.
- Die Absolventinnen und Absolventen besitzen Abstraktionsvermögen, analytisches Denken, Problemlösungskompetenz und die Fähigkeit, fortgeschrittene Zusammenhänge zu strukturieren.
- Die Absolventinnen und Absolventen sind in der Lage, fortgeschrittene Methoden der Informatik auf konkrete praktische oder theoretische Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.
- Die Absolventinnen und Absolventen setzen die erlernten theoretischen und praktischen Methoden in geschlossener Form ein, um zu zeigen, dass sie zur Anwendung der Konzepte wissenschaftlichen Arbeitens befähigt sind.
- Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.
- Die Absolventinnen und Absolventen sind in der Lage, konstruktiv und zielorientiert in einem Team zusammenzuarbeiten und auftretende Konflikte zu lösen (Teamfähigkeit).
- Die Absolventinnen und Absolventen können ihre erworbenen Kompetenzen in unterschiedlichen interkulturellen Kontexten und in international zusammengesetzten Teams anwenden.
- Die Absolventinnen und Absolventen kennen wichtige Anforderungen und Arbeitsweisen im gewerblichen Umfeld sowie in Forschung und Entwicklung.
- Die Absolventinnen und Absolventen sind befähigt, Probleme zu analysieren und zu lösen und sich in weniger vertraute Themenkomplexe einzuarbeiten.

Persönlichkeitsentwicklung

- Eigenverantwortlichkeit, Selbstständigkeit, Zeitmanagement, Teamfähigkeit
- Die Absolventinnen und Absolventen kennen die Regeln guter wissenschaftlicher Praxis und beachten sie.
- Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.

Befähigung zum gesellschaftlichen Engagement

- Die Absolventinnen und Absolventen können Entwicklungen im Informationssektor kritisch reflektieren und deren Auswirkungen auf die Wirtschaft, Gesellschaft und die Umwelt in Ansätzen erfassen (Technikfolgenabschätzung).
- Die Absolventinnen und Absolventen haben ihr Wissen bezüglich wirtschaftlicher, gesellschaftlicher, kultureller etc. Fragestellungen erweitert und können in Ansätzen begründet Position beziehen.
- Die Absolventinnen und Absolventen entwickeln die Bereitschaft und Fähigkeit, ihre Kompetenzen in partizipative Prozesse einzubringen und aktiv an Entscheidungen mitzuwirken.

Master's with 1 major Computer Science (2016)	JMU Würzburg • generated 19-Apr-2025 • exam.	page 5 / 119
	reg. data record Master (120 ECTS) Informatik - 2016	

Abbreviations used

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:

ASPO2015

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

15-Dec-2015 (2015-261) except for mandatory electives added 10-I=DB2-161 and 10-I=STM-162 in Fast Track procedure, 10-I=PRJAK-161 replaced by 10-I=PRJAK-162 and 10-I-MA-MK-161 replaced by 10-I-MA-MK-162 and in module 10-I-MA-161 added exam language "German and/or English" at a later time

10-Nov-2016 (2016-106) except for mandatory elective added 10-I=STM-162 in Fast Track procedure, 10-I=PRJAK-161 replaced by 10-I=PRJAK-162 and 10-I-MA-MK-161 replaced by 10-I-MA-MK-162 at a later time

11-Aug-2016 (2016-96)

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-spe-

Master's with 1 major Computer Science (2016)	JMU Würzburg • generated 19-Apr-2025 • exam.	page 6 / 119
	reg. data record Master (120 ECTS) Informatik - 2016	



cific 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.



Compulsory Courses

(20 ECTS credits)

Module title					Abbreviation		
Seminar 1 - Current Topics in Computer Science					10-l=SEM3-161-m01		
Module coordinator				Module offered by			
Dean of	f Studi	es Informatik (Computer :	Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
5		rical grade					
Duratio		Module level	Other prerequisites				
1 seme:		graduate					
Conten		Sidduite	<u> </u>				
Indepe	ndent ı	review of a current topic i nd oral presentation.	n computer science b	oased on literature a	nd, where applicable, software		
Intende	ed lear	ning outcomes					
					ce, to summarise the main		
		tten form and to orally pr					
	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
S (2)			·				
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether		
		o to 15 pages) and presen uter science	itation (30 to 45 minu	ites) with subseque	nt discussion on a topic from th		
	•	ssessment: German and,	/or English				
Allocat							
Additio	nal inf	ormation	·				
		able for students of the N LR, HCI´, GE.	laster's programme li	nformatik (Compute	r Science, 120 ECTS credits): AT,		
Worklo	ad		·				
150 h							
Teachir	ıg cycl	e					
	<u> </u>						
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)			
		(orallinguation regulation					
Module	e appea	ars in					
Master'	's degr	ee (1 major) Computer Sc	ience (2016)				
	-	ee (1 major) Mathematics					
Master's degree (1 major) Computational Mathematics (2016)							
Master's degree (1 major) Digital Humanities (2016)							
	Master's degree (1 major) Computer Science (2017)						
	-	ee (1 major) Computer Sc					
	-	ee (1 major) Computation		9)			
	-	ee (1 major) Mathematics	-				
Master'	's teacl	Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)					
-		ry course MINT Teacher E					

Module title			Abbreviation			
Seminar 2 - Current Topics in Computer Science				10-I=SEM4-161-m01		
Module coordinator				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				
Content	ts					
		review of a current topic in nd oral presentation.	n computer science b	based on literature a	nd, where applicable, software	
Intende	ed learr	ning outcomes				
		are able to independently tten form and to orally pro			ce, to summarise the main	
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
S (2)						
		essment (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
semina	r	o to 15 pages) and presen ssessment: German and/		ites) with subsequer	nt discussion on the topic of the	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
		able for students of the M _R, HCI, GE	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): AT,	
Workloa	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer Science (2016)						
	-	ee (1 major) Computer Sc				
	-	ee (1 major) Computer Sc				
waster	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)

Module title				Abbreviation	
Practical course - Current Topics in Computer Science				10-I=PRAK-161-m01	
Module coordinator				Module offered by	
Dean o	of Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts		•		
Comple	etion of	f a practical task.			
		ning outcomes			
		allows participants to wo	rk on a problem in co	mputer science in te	eams.
-	-	number of weekly contact hours, I		•	
P (6)	.,,,,,,	,		•	
module i	s creditab aper (5	sessment (type, scope, langua ele for bonus) to 15 pages) ssessment: German and		examination offered — if nc	ot every semester, information on whether
Allocat					
 Additio	onal inf	ormation			
		able for students of the M LR, HCI, GE	Aaster's programme I	nformatik (Computer	r Science, 120 ECTS credits): AT,
Worklo	oad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)	
Module appears in					
Master	's degr	ee (1 major) Computer Sc	ience (2016)		
Master's degree (1 major) Computer Science (2017)					
	-	ee (1 major) Computer Sc			· · · · ·
					ork Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)					

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



Compulsory Electives

(70 ECTS credits)

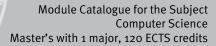
Module title				Abbreviation	
3D Point Cloud Processing					10-l=3D-161-m01
Module	coord	inator		Module offered by	
holder	of the C	Chair of Computer Scienc	e XVII	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten					
	registı				oc-trees), calculating normals, k- mapping, applications to mobile
Intende	ed learr	ning outcomes			
munica data pr	te with ocessir	engineers / surveyors /	CV people / etc. Stud that real application	ents are able to solv scenarios are challe	l processing and are able to com- re problems of modern sensor enging in terms of computational issues.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) + Module		t in: English			
		e ssment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus					
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Focuses IS,LR,H		able for students of the M	laster's programme lr	nformatik (Computer	Science, 120 ECTS credits):
Worklo	ad				
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
	-	ee (1 major) Computer Sc			
	-	ee (1 major) Computer Sc			
Master's degree (1 major) Computer Science (2018)					

Module title					Abbreviation
Operating Systems					10-l=BS-161-m01
Module coordinator				Module offered by	
holder	of the (Chair of Computer Scienc	e II	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				
schedu nageme	lers, pr ent, seg	ocess synchronisation, s	emaphores, monitor ystems, interfaces, d	s, critical regions, de	eads, cooperating processes, eadlocks, dynamic memory ma- etwork file systems, hard drive
Intende	ed learr	ning outcomes			
The stu	dents p	oossess knowledge and p	practical skills in buil	ding and using esse	ntial parts of operating systems.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) +	Ü (2)				
		e essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
lf annoi examin prox. 15 Separat	unced l ation o 5 minut te writt ge of a	f one candidate each (ap es per candidate). en examination for Maste ssessment: German and/	inning of the course, prox. 20 minutes) or er's students.		tion may be replaced by an oral i in groups of 2 candidates (ap-
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Focuses SE,ES,G		able for students of the M	laster's programme lr	nformatik (Computer	r Science, 120 ECTS credits):
Worklo	ad				
150 h					
Teaching cycle					
Referre	d to in	LPOI (examination regulations	for teaching-degree progra	mmes)	
Module appears in					
		ee (1 major) Computer Sc			
		ee (1 major) Computer Sc			
waster	s aegre	ee (1 major) Computer Sc	ierice (2018)		

Module title				Abbreviation	
Data Mining				10-I=DM-161-m01	
Module coordinator				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 seme	ster	graduate			
Conten	ts				
model, methoc SVM), l	relatio ls (clus earninន្	nship to data warehouse ter- and association met g methods for special dat	and OLAP data prepi hods), supervised lea	rocessing, data visua arning (e. g. Bayes cl	covery in databases, process alisation, unsupervised learning assification, KNN, decision trees,
		ning outcomes		C	
ta mini the kno	ng and wledge	machine learning. They a	are able to solve prac and by using the KDD	tical knowledge disc	and algorithms in the area of da- covery problems with the help of acquired experience in the use
		umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) +	Ü (2)				
		e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus					
Allocat					
Additio	nal inf	ormation			
Focuse: IS, HCI,		able for students of the M	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): IT,
Worklo	ad				
150 h					
Teachir	ng cycl	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master	Master's degree (1 major) Computer Science (2016)				
Master's degree (1 major) Digital Humanities (2016)					
	-	ee (1 major) Computer Sc	-		
Master	's degre	ee (1 major) Computer Sc	ience (2018)		

Module title Abbreviation						
Databa	ises				10-l=DB-161-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Compute	er Science)	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5		rical grade		•		
Duratio		Module level	Other prerequisites	;		
	1 semester graduate					
	Contents					
Relatio	nal alg	ebra and complex SQL anagement.	statements; database	planning and norma	l forms, XML data mo	odelling;
Intende	ed lear	ning outcomes				
The stu	ıdents	possess knowledge ab g in XML.	out data modelling and	d queries in SQL, trar	sactions as well as a	about easy
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		s essment (type, scope, lang ole for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
prox. 19 Separa	5 minut ite writt age of a	of one candidate each (tes per candidate). ten examination for Ma ssessment: German ar bonus	ster's students.	r an oral examination	in groups of 2 cand	idates (ap-
Allocat	ion of _l	places				
Additio	onal inf	ormation				
Focuse IS, HCI,		able for students of the	Master's programme	nformatik (Computer	r Science, 120 ECTS o	credits): SE,
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
				-		
Module	e appea	ars in				
Module appears in Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Physics (2016)						
Master's degree (1 major) Digital Humanities (2016)						
Master's degree (1 major) Computer Science (2017)						
	Master's degree (1 major) Computer Science (2018)					
	Master's degree (1 major) Physics (2020) Master's degree (1 major) Physics International (2020)					
	-	ee (1 major) Physics int ee (1 major) Quantum E				
	-	ee (1 major) Quantum E				
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • ord Master (120 ECTS) Informa		page 16 / 119





Master's degree (1 major) Physics International (2024)

Module title Abbreviation					Abbreviation
Databases 2				10-l=DB2-161-m01	
Module	Module coordinator			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		rical grade		•	
Duratio		Module level	Other prerequisites		
1 seme		graduate			
Conten		3.444440			
		ses and data mining; wel	b databases: introdu	ction to Datalog.	
		ning outcomes	,		
		nave advanced knowledg	e about relational da	tabases XMI and da	ata mining
		umber of weekly contact hours, l			
		uniber of weekly contact hours, t	anguage — If other than der		
V (2) +		••			
		;essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
		nation (approx. 60 to 120	minutes)		
				the written examina	tion may be replaced by an oral
examin	ation o	f one candidate each (ap			in groups of 2 candidates (ap-
		es per candidate).	<i>,</i>		
Langua credital		ssessment: German and,	or English		
Allocat					
Allocal		Jaces			
	nal inf	ormation			
			laster's programme lr	nformatik (Computer	Science, 120 ECTS credits): SE,
IS, HCI.				·····	,,,,,,,,,,,,,,,
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	Module appears in				
Master'	Master's degree (1 major) Computer Science (2016)				
Master's degree (1 major) Business Information Systems (2016)					
Master's degree (1 major) Computer Science (2017)					
	-	ee (1 major) Computer Sc			
Master'	s degr	ee (1 major) Information S	Systems (2019)		
Master'	s teach	ning degree Gymnasium I	WINT Teacher Educati	on PLUS, Elite Netwo	ork Bavaria (ENB) (2020)
Supple	mentar	y course MINT Teacher E	ducation PLUS, Elite N	letwork Bavaria (ENI	B) (2020)
Master'	s degr	ee (1 major) Aerospace Co	omputer Science (202	20)	
Master'	s degr	ee (1 major) eXtended Art	ificial Intelligence (xt	AI) (2020)	

Module	Module title Abbreviation					
Interac	tive Co	mputer Graphics			10-l=lCG-161-m01	
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scier	ice IX	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	1 semester graduate					
Conten	Contents					
cifically contem about l jection line wil	v conce porary ight an as well l be co panying	phics studies methods ntrates on interactive g as well as for novel hund d images, lighting mod as texturing methods. mplemented by algorith g software solutions wil	raphics with an additic man-computer interfac els, data representatio Theoretical aspects of mical approaches for	onal focus on 3D gra es and computer ga ns, mathematical fo the steps involved in interactive image syn	phics as a requireme mes. The course will rmulations of moven n ray-tracing and the ntheses using compo	ent for many cover topics nents, pro- raster pipe- uter systems.
Intende	ed learı	ning outcomes				
comput	ter grap	he course, the students bhics. They will be able s applications and to cl	to implement a promir	nent variety of these		
Course	S (type, n	umber of weekly contact hours	, language — if other than Ger	rman)		
V (2) +	Ü (2)					
		e essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
lf anno examin prox. 19 Separa	unced ation o 5 minut te writt ge of a	nation (approx. 60 to 12 by the lecturer at the be f one candidate each (a es per candidate). en examination for Mas ssessment: German an bonus	ginning of the course, approx. 20 minutes) or ster's students.		<i>,</i> ,	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse	s availa	able for students of the	Master's programme li	nformatik (Computer	Science, 120 ECTS o	redits): HCI.
Worklo	ad					
150 h						
Teachi	ng cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	rs in				
Master Master	Module appears in Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018) Master's degree (1 major) eXtended Artificial Intelligence (xtAl) (2020)					
Master's wi	th 1 major	Computer Science (2016)		rrg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 19 / 119

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

Module title Abbreviation					Abbreviation
Computa	tional Complex	ity			10-I=KT-161-m01
Module c	coordinator			Module offered by	
Dean of S	Studies Informat	tik (Computer S	Science)	Institute of Comput	er Science
ECTS N	Aethod of gradi	ng	Only after succ. com	pl. of module(s)	
5 n	numerical grade				
Duration	Module le	vel	Other prerequisites		
1 semester graduate					
Contents	<u> </u>				
sumption	n versus comput	tation time, de		eterminism, hierarch	nd time classes, memory con- nical theorems, translation me- of systems.
Intended	learning outco	mes			
classes, g determin	general relation	ships between terminism, hie	space and time clas erarchical theorems, t	ses, memory consum	complexity measurements and nption versus computation time, , P-NP problem, completeness
Courses ((type, number of wee	kly contact hours, l	anguage — if other than Ger	man)	
V (2) + Ü	(2)				
	of assessment (t reditable for bonus)	ype, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
lf announ examinat prox. 15 n Separate Language		urer at the beg lidate each (ap didate). ation for Maste	inning of the course, prox. 20 minutes) or er's students.		tion may be replaced by an oral in groups of 2 candidates (ap-
Allocatio	n of places				
Additiona	al information				
Focuses a IT, IS, ES,		dents of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): AT,
Workload	d				
150 h					
Teaching	cycle				
Referred	to in LPO I (exam	nination regulations	for teaching-degree progra	mmes)	
Module a	appears in				
Master's	degree (1 major degree (1 major degree (1 major) Computer Sc	ience (2017)		

Module title Abbreviation					Abbreviation
Cryptog	graphy	and Data Security			10-I=KD-161-m01
Module	coord	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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester graduate					
Content	ts				
RSA, Di	ffie-He		ser-Micali, digital sig	nature, challenge-re	oublic key cryptography systems, sponse methods, secret sharing,
Intende	d learr	ning outcomes			
stems, ^v wasser-	Vernan Micali,	n one-time pad, AES, per	fect security, public k nge-response metho	ey cryptography, RS	private key cryptography sy- A, Diffie-Hellman, Elgamal, Gold- llionaire problem, secure circuit
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (2) + Ü	Ü (2)				
		e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
lf annou examina prox. 15 Separat	unced l ation o minut te writt ge of a	f one candidate each (ap es per candidate). en examination for Maste ssessment: German and/	inning of the course, prox. 20 minutes) or er's students.		tion may be replaced by an oral in groups of 2 candidates (ap-
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Focuses SE, IT, I		able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): AT,
Worklo	ad				
150 h					
Teachin	ig cycl	e			
Referre	d to in	LPOI (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in in			
Master'	s degre	ee (1 major) Computer Sc ee (1 major) Computer Sc ee (1 major) Computer Sc	ience (2017)		

Module title Abbreviation						
Advanc	ed Pro	gramming			10-I=APR-161-m01	
Module	coord	inator		Module offered by		
holder	of the (Chair of Computer Scier	ice II	Institute of Comput	er Science	
ECTS	ECTS Method of grading Only after succ. con			pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	1 semester graduate					
Contents						
grams. and cod	If more de dup nsible	vledge of basic program complex problems are licates occur. In this lec structure. Also, further	to be tackled, subopti ture, further knowledg	mal results like long e is to be conveyed o	, incomprehensible on how to give progr	functions ams and co-
Intende	ed lear	ning outcomes				
then im allel pro sing.	ipleme ocessir	n advanced programmir nted in multiple langua ng concepts are introdu	ges and their efficienc ced culminating in the	y measured using sta use of GPU architect	andard metrics. In a	dition, par-
		number of weekly contact hours	, language — if other than Ger	man)		
V (2) +	<u> </u>					
		sessment (type, scope, langu le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
lf annoi examin prox. 15	unced ation c 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (a res per candidate). ssessment: German an bonus	ginning of the course, approx. 20 minutes) or			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuses SE,IS,LI		able for students of the ES,GE	Master's programme l	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachir	ng cycl	е				
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)		
Module	appea	ars in				
Master' Master' Master' Master' Master'	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 with 1 major Computer Science (2016) MMU Würzburg • generated 19-Apr-2025 • exam. page 23 / 119					
			reg. data reco	rd Master (120 ECTS) Informa	tik - 2016	

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)

s numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intended learning outcomes Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language if other than German) V (2) + Ü (2) Wethod of assessment (type, scope, language if other than German, examination offered if not every semester, information on whether module is creditable for 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 (approx. 15 minutes per candidate). Separate written examination of Master's students. 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): SE, IS, LR, HCI. Workload 150 h Teaching cycle	Module title Abbreviation					Abbreviation
Dear of Studies Informatik (Computer Science) Institute of Computer Science ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language if other than German) V (2) + Ū (2) Method of assessment (type, scope, language if other than German, examination offered if not every semester, information on whether module is creditable for bonus) Mitten examination (approx. 6o 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). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus Addition	Object	oriente	ed Programming		10-l=00P-161-m01	
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade	Module	coord	inator		Module offered by	
5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language if other than German) V (2) + Ü (2) Method of assessment (type, scope, language if other than German, examination offered if not every semester, information on whether module is creditable for 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 (approx. 15 minutes per candidate). Separate written examination for Master's students. 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): SE, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) -	Dean of	fStudie	es Informatik (Computer S	Science)	Institute of Comput	er Science
Duration Module level Other prerequisites 1 semester graduate Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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. 35 minutes per candidate). Separate written examination for Master's 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, SL, LH, HCI. Workload 150 h Teac	ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
1 semester graduate Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intendel learning outcomes Intendel learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus Allocation of places	5	nume	rical grade			
Contents Polymorphism, generic programming, meta programming, web programming, templates, document management. Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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 (approx. 15 minutes per candidate). Separate written examination for Master's students. 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): SE, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO 1 (examination regulations for teaching-degree programmes) Module appears in	Duratio	n	Module level	Other prerequisites		
Polymorphism, generic programming, meta programming, web programming, templates, document manage- ment. Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ú (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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). Separate written examination for Master's students. Language of assessment: German and/or English creditable for bonus Allocation of places	1 seme	ster	graduate			
ment. Intended learning outcomes Intended learning outcomes The students are proficient in the different paradigms of object-oriented programming and have experience in their practical use. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Û (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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). Separate written examination for Master's 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, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Conten	ts				
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their practical use. 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 semester, information on whether module is creditable for 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). Separate written examination for Master's 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, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Intende	ed learr	ning outcomes			
V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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). Separate written examination for Master's 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, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in			•	ent paradigms of obj	ect-oriented progran	nming and have experience in
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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 (approx. 15 minutes per candidate). Separate written examination for Master's 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, IS, IR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
module is creditable for 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). Separate written examination for Master's 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, IS, LR, HCl. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	V (2) +	Ü (2)				
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). Separate written examination for Master's 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, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in				ge — if other than German, e	examination offered — if no	t every semester, information on whether
Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	lf annoi examin prox. 15 Separat Langua	unced l ation o 5 minut te writt ge of a	by the lecturer at the beg f one candidate each (ap es per candidate). en examination for Maste ssessment: German and,	inning of the course, prox. 20 minutes) or er's students.		
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Allocat	ion of p	olaces			
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in						
IS, LR, HCI. Workload 150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Additio	nal info	ormation			
150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in			able for students of the N	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): SE,
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Worklo	ad				
Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	150 h	150 h				
 Module appears in	Teachir	Teaching cycle				
 Module appears in						
	Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
	Module	appea	in in			
Master's degree (1 major) Computer Science (2016)	Master'	s degre	ee (1 major) Computer Sc	ience (2016)		

Module title Abbreviation				Abbreviation	
Comput	ter Arcl	hitecture			10-I=RAK-161-m01
Module	Module coordinator			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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
		architectures, command ector processors, multi-c		pipelining, statical a	and dynamic instruction schedu-
Intende	d learr	ning outcomes			
		naster the most importar operating systems.	nt techniques to desig	gn fast computers as	s well as their interaction with
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V (2) + ĺ	Ü (2)				
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
examin prox. 15 Separat	ation o ; minut te writt ge of a	f one candidate each (ap es per candidate). en examination for Maste ssessment: German and/	prox. 20 minutes) or er's students.		tion may be replaced by an oral in groups of 2 candidates (ap-
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Focuses IT, ES, L		able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits): SE,
Worklo	ad				
150 h					
Teachin	ig cycl	e			
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	appea	rs in			
Master' Master'	Module appears in Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computer Science (2021)				

Module title Abbreviation						
Compu	Computer Networks and Communication Systems 10-I=RK-161-m01					
Module coordinator Mode			Module offered by			
holder of the Chair of Computer Science III			nce III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duration Module level Other prerequisites						
1 seme	1 semester graduate					
Conten	ts		1			
of com and str chies, o and ISO Mobile works.	puter n ructure dataflor D archit comm	computer and commun etworks and communic of computer networks: w control and traffic co cecture models. Interne unication networks: fur	ation systems: problem network structure, net ntrol, transfer network. t: structure and basic r	m statement and intr work access, access Communication pro nechanism, TCP/IP,	oduction to method methods, digital tra- tocols: fundamental routing, network ma	architecture nsfer hierar- principles nagement.
Intende	ed lear	ning outcomes				
		possess an intricate kn damental principles to		re of computer netwo	orks and communica	tion systems
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (4) +	Ü (2)					
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
lf anno examin prox. 1 <u>9</u> Separa	unced ation o 5 minut te writt age of a	nation (approx. 60 to 12 by the lecturer at the bo of one candidate each (ees per candidate). en examination for Ma ssessment: German an bonus	eginning of the course, approx. 20 minutes) or ster's students.			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse ES, LR.	s availa	able for students of the	Master's programme I	nformatik (Compute	r Science, 120 ECTS o	credits): IT,
Worklo	ad					
240 h						
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer Science (2016)						
	Master's degree (1 major) Computer Science (2017)					
	-	ee (1 major) Computer S		ion DILIC Elito Noter	ork Povaria (END) (a.	020)
		ning degree Gymnasiur 7y course MINT Teacher				020)
		r Computer Science (2016)		urg • generated 19-Apr-2025		page 27 / 119
				rd Master (120 ECTS) Informa		



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)

Knowledge-based Systems 10-1=WBS-161-m01 Module cordinator Module offered by holder of the Chair of Computer Science VI Institute of Computer Science ECTS Method of Grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites Contents graduate Foundations in the following areas: knowledge management systems, knowledge representation, solving methods, knowledge acquisition, learning, guidance dialogue, semantic web. Intended learning outcomes The students possess theoretical and practical knowledge for the understanding and design of knowledge-based systems including knowledge for aussitation and have acquired experience in a small project. 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 offered – if not every semester, information on whether module is creditable for bonus) Written examination of one candidate each (approx. 20 minutes). If anounced by the lecturer at the beginning of the course, the written examination in groups of 2 candidate (approx. 20 minutes per candidate). Separate written examination for Master's students.	Module title	Abbreviation				
holder of the Chair of Computer Science VI Institute of Computer Science ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Foundations in the following areas: knowledge management systems, knowledge representation, solving methods, knowledge acquisition, learning, guidance dialogue, semantic web. Intended learning outcomes The students possess theoretical and practical knowledge for the understanding and design of knowledge-based systems including knowledge formalisation and have acquired experience in a small project. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) 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). If announced by the lecturer at the beginning of the course, the written examination in groups of 2 candidates (approx. 20 minutes). If announced by the lecturer at the beginning of the course, the written examination in groups of 2 candidates (approx. 20 minutes). If announce of places If announce of places If announced is assessment: German and/or English creditable fo	Knowledge-ba	ased Systems			10-I=WBS-161-m01	
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade	Module coord	Module coordinator				
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Duration Module level Other prerequisites 1 semester graduate Contents Foundations in the following areas: knowledge management systems, knowledge representation, solving methods, knowledge acquisition, learning, guidance dialogue, semantic web. Intended learning outcomes The students possess theoretical and practical knowledge for the understanding and design of knowledge-based systems including knowledge formalisation and have acquired experience in a small project. Courses (type, number of weekly contact hours, language – if other than German) V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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 (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 30 minutes) per candidate). Separate written examination for Master's 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, IS, HCI, GE. <	ECTS Methe	od of grading	Only after succ. com	pl. of module(s)		
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150 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	module is creditable written exami If announced examination of prox. 15 minut Separate writt Language of a creditable for Allocation of p Additional inf Focuses availa IT, IS, HCI, GE	module is creditable for 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). Separate written examination for Master's 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,				
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in						
Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in		_				
 Module appears in	leaching cycl	e				
 Module appears in		-				
	Referred to in	LFUI (examination regulations	s for teaching-degree progra	mmes)		
	 Module appea	ars in				
			ience (2016)			
Master's degree (1 major) Computer Science (2017)	-					
Master's degree (1 major) Computer Science (2018)						

Module title Abbreviation					Abbreviation
Project - Current Topics in Computer Science					10-I=PRJAK-162-m01
Module	Module coordinator			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				
Comple	etion of	a project task (in Teams)).		
Intende	ed learı	ning outcomes			
The pro	ject all	ows participants to work	on a problem in com	puter science in tear	ms.
		umber of weekly contact hours, l			
P (4)					
Method		essment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
Each pr same to Langua	oject is opic. As ge of a	,	he project will not be , only be offered for t or English	repeated; there will he project offered in	not be another project with the the respective semester.
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
		able for students of the M _R, HCI, GE.	laster's programme lr	nformatik (Computer	Science, 120 ECTS credits): AT,
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
		ee (1 major) Computer Sc	ience (2016)		
Master's degree (1 major) Computer Science (2017)					
Master's degree (1 major) Computer Science (2018)					
Master's degree (1 major) Management (2018)					
Master's degree (1 major) Computational Mathematics (2019)					
	-	ee (1 major) Mathematics	-		
	-	ee (1 major) Media Comm	-		
	-	ee (1 major) Information S			
		ning degree Gymnasium I ry course MINT Teacher Eo			
Jupple	mental	y course mint reacher El			

Module title Abbreviation						
Advanc	ed Aut	omation			10-I=AA-152-m01	
Module	e coord	inator		Module offered by		
holder of the Chair of Computer Science VII			Institute of Compute	er Science		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Contents					
		ics in automation system nsor data processing, a				
Intende	ed lear	ning outcomes				
		have an advanced know d automation systems.	ledge of selected topi	cs in automation sys	tems. They are able	to imple-
Course	S (type, r	number of weekly contact hours	, language — if other than Ger	rman)		
V (4) +	Ü (2)					
		sessment (type, scope, langu le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
written credita		nation (approx. 60 to 12 bonus	o minutes)			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse IT,IS,ES		able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
240 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)		
§ 22						
Module						
First sta Master Master Master Supple Master Master Master Master Master	Master's degree (1 major) Space Science and Technology (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) 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's degree (1 major) Computer Science (2018) 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)					
		r Computer Science (2016)	JMU Würzbı	rrg • generated 19-Apr-2025 • rd Master (120 ECTS) Informat	exam.	page 31 / 119

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

Module	e title		Abbreviation						
Algorit	hms fo	r Geographic Informati	on Systems		10-I=AGIS-161-m01				
Module coordinator				Module offered by					
holder of the Chair of Computer Scienc			nce l	Institute of Computer Science					
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)					
5 numerical grade									
			Other prerequisites	Other prerequisites					
1 seme	ster	graduate	 						
Conten		3.44440							
Algorithmic foundations of geographic information systems and their application in selected problems of acqui- sition, processing, analysis and presentation of spatial information. Processes of discrete and continuous opti- misation. Applications such as the creation of digital height models, working with GPS trajectories, tasks of spa- tial planning as well as cartographic generalisation.									
Intende	ed lear	ning outcomes							
The students are able to formalise algorithmic problems in the field of geographic information systems as well as to select and improve suitable approaches to solving these problems.									
Courses (type, number of weekly contact hours, language — if other than German)									
V (2) +									
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)									
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	olaces							
Additio	nal inf	ormation							
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,IS,HCI									
Worklo	ad								
150 h									
Teachi	ng cycl	e							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Module	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 degree (1 major) Computer Science (2017)									
Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)									
	-		onal Mathematics (201	0)					
	-	ee (1 major) Computati ee (1 major) Mathemati		7/					
	<u> </u>	r Computer Science (2016)		Irg • generated 19-Apr-2025 •					

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) Aerospace Computer Science (2020)

Module	title		Abbreviation							
Compu	tationa	l Geometry		10-I=AG-161-m01						
Module coordinator				Module offered by						
holder	of the (Chair of Computer Scier	e I Institute of Computer Science							
ECTS	Metho	od of grading	Only after succ. com	Only after succ. compl. of module(s)						
5 numerical grade										
			Other prerequisites	ther prerequisites						
1 seme	ster	graduate								
Conten	Contents									
In many areas of computer science for example robotics, computer graphics, virtual reality and geographic in- formation systems it is necessary to store, analyse, create or manipulate spatial data. This class is about the algorithmic aspects of these tasks: We will acquire techniques that are needed to plan and analyse geometric al- gorithms and data structures. Every technique will be illustrated with a problem in the practical areas listed abo- ve.										
Intended learning outcomes										
The students are able to decide which algorithms or data structures are suitable for the solution of a given geo- metric problem. The students are able to analyse new problems and to come up with their own efficient solutions based on the concepts and techniques acquired in the lecture.										
Course	S (type, r	umber of weekly contact hours	, language — if other than Ger	man)						
V (2) +	Ü (2)									
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 p	Diaces								
		ormation								
Focuse: AT,HCI,		able for students of the	Master's programme li	nformatik (Computer	Science, 120 ECTS o	credits):				
Worklo	ad									
150 h										
Teachir	ıg cycl	e								
Referred to in LPO I (examination regulations for teaching-degree programmes)										
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's degree (1 major) Computer Science (2018)										
Master's wi	th 1 majo	r Computer Science (2016)		rg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 35 / 119				

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) Aerospace Computer Science (2023)

Module	title				Abbreviation	
Approx	imatio	n Algorithms			10-I=APA-161-m01	
Module	coord	inator		Module offered by		
holder	of the (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	n	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts					
there an are use drafting practica greedy,	re man d whic g and a al optir local s	ding the optimal soluti y problems without an h do not always give th nalysing techniques fo nisation problems, the search, scaling as well	efficient algorithm for a e optimal solution but r algorithms which hav lecture will introduce s	an optimal solution. always give good so ve a proven approxim students to importan	As a result, in praction lutions. This lecture ation quality. With t	ce, methods will discuss he help of
		ning outcomes				
dament	tal draf	are able to analyse eas ting techniques such a l are able to apply thes	s greedy, local search			
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
lf anno examin prox. 15	unced ation c 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (res per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) or			-
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse: AT,IT,G		able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachir	ıg cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
§ 22	Vr. 3 b)					
Module	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 degree (1 major) Computer Science (2017)						
Master's wi	th 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • ord Master (120 ECTS) Informa		page 37 / 119
			reg. uata reco	na master (120 ECTS) miorma	uk - 2010	

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

UNIVERSITÄT

WÜRZBURG

Module	e title				Abbreviation	
Automa	ata The	ory			10-I=AUT-161-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	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				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		-			
words,	Finite automata, regular languages, star-free languages, natural equivalence relations, predicate logic with words, language acceptance through monoids, syntactic monoid, predicate logical and algebraic characterisation of regular languages and star-free languages, two-way automata.					
Intende	ed lear	ning outcomes				
ges, sta	ar-free Is, synt	possess a fundamental a languages, natural equiv cactic monoid, predicate nata.	alence relations, pred	dicate logic with wor	ds, language accept	ance through
Course	S (type, r	number of weekly contact hours,	language — if other than Gei	man)		
V (2) +	Ü (2)					
module is	creditab	sessment (type, scope, langu- le for bonus) nation (approx. 60 to 120		examination offered — if no	t every semester, informati	on on whether
examin prox. 1	ation c 5 minut ge of a	by the lecturer at the beg of one candidate each (a ses per candidate). ssessment: German and bonus	pprox. 20 minutes) or			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse IT, ES, I		able for students of the N	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits): AT,
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	is for teaching-degree progra	mmes)		
			0.0001			
Module	appea	urs in				
			cience (2016)			
Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016)						
		ning degree Gymnasium				016)
		y course MINT Teacher E		Network Bavaria (EN	B) (2016)	
	-	ee (1 major) Computer S				
	-	ee (1 major) Computer S		`		
		ee (1 major) Computation		•		
iviaster s W	ин т шајо	r Computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 39 / 119



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)

Module title			Abbreviation			
Avionics Systems 10-I=AVS-161-m01						
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e VIII	Institute of Comput	er Science	
ECTS	1	od of grading	Only after succ. com	· · ·		
5		rical grade		<u> </u>		
Duratio		Module level	Other prerequisites			
1 seme		graduate				
		glauuale				
Conten				· · · · ·		
commu	unicatio	<i>ionik-Systeme (Avionics S</i> on of airplanes and satell isors and actuators, 5. se	ites: 1. software mod	ule and the software		
Intend	ed lear	ning outcomes				
At the e	end of t	he course, the students : . They should be able to		<i>,</i>		
		number of weekly contact hours, I			<u>,</u>	-
V (2) +	-					
		accmant (tuna coona langua		warmination offered if no	t over comester informati	on on whathar
		sessment (type, scope, langua le for bonus)	age — If other than German, e	examination offered — If no	t every semester, informati	on on whether
prox. 1 Langua	5 minut	of one candidate each (ar tes per candidate). ssessment: German and bonus		an oral examination	in groups of 2 cand	idates (ap-
	ion of p					
Allocal						
Additio	nalinf	ormation				
			A - at - vla, w va - sva wa wa a lu			
ES,LR	S avalla	able for students of the N	haster's programme n	normatik (Computer	Science, 120 ECTS (realts):
Worklo	ad					
150 h						
	ng cycl	e	-			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
	<u></u>					
Module	e appea	ars in				
			cience (2016)			
Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Computational Mathematics (2016)						
Master	's teacl	hing degree Gymnasium	MINT Teacher Educati	on PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)
Supple	menta	ry course MINT Teacher E	ducation PLUS, Elite I	Network Bavaria (EN	B) (2016)	
		ee (1 major) Computer Sc				
	-	ee (1 major) Computer Sc				
	-	ee (1 major) Computatior		9)		
Master	's degr	ee (1 major) Mathematics	5 (2019)			
Master's w	ith 1 majo	r Computer Science (2016)	JMU Würzbu	rg • generated 19-Apr-2025 •	exam.	page 41 / 119

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)

Multimodal User Interfaces 10-HCI=MMUU-161-mo1 Module coordinator Module offered by Institute of Computer Science IX 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 Contents Contents Contents Contents Contents Contents In the site of the Chair of Computers and machines. Basically, multimodal interaction includes the analysis as usel as the synthesis of multimodal unteraction. In multimodal systems, this process in the radues of the analysis as used as well as the synthesis of multimodal unteraction. In multimodal systems, this process in teraction and understanding of the input and to execute the desire interaction. In multimodal systems, this process in teraction and understanding of the input and to execute the desire interaction. In multimodal as well as multimodal interaction includes the analysis as protein multimodal interaction. In multimodal interaction and understanding of the input and to execute the desire involas protein systems, this process ing as a	Module	title				Abbreviation
holder of the Chair of Computer Science IX 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 Contents Contents Contents Contexts Contexts Contexts Contexts Contexts Contexts of the input and the execute the desired interaction. In multimodal systems, this process is interlea- vel between various modalities and multiple interdependencies exist between simultaneous ulterances 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 multimodal integration. Segmenticanalysis Segmenticanalysis	Multim	odal U	ser Interfaces			10-HCI=MMUI-161-m01
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents 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 uteraces. This course concentrates on the analysis, i.e., the 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 uterances necessary to take into account for a successful machine interpretation. In multimodal as well as multimodal input. The course will highlight typical stages in multimodal processing. Using speech processing as a primary example, they learn about: 1. A/D conversion 2. Segmentation 3. Syntactical analysis 5. Discourse analysis 6. Discourse analysis 6. Discourse analysis 6. Discourse analysis 7 After the course, the students will be able to build their own multimodal interfaces. They will have a broad understanding of all the necessary steps involved and will know prominent algorithmic solutions for each of them. Student will learn about variitable tor bours Courses (type, number of we	Module	coord	inator		Module offered by	
5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents 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 uterances. 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 uterances necessary to take into account for a successful machine interpretation. In this course, students will learn about: 1.A/D conversion 2. Segmentation - 3. Syntactical analysis - 4. Seenantic analysis - 5. Discourse analysis - 6. Discourse analysis - 7. Course ing are derived. Prominent multimodal integration (aka multimodal fusion) approaches are described, including of all the necessary steps involved and fusion) approaches are described, including of all the necessary steps involved and will know prominent algorithmic solutions for each of them. Students will be able to build their own multimodal interfaces. They will have a broad understanding of all the necessary steps in	holder	of the O	Chair of Computer Scienc	e IX	Institute of Comput	er Science
Duration Module level Other prerequisites 1 semester graduate Contents 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 multimodal input. The course will highlight typical stages in multimodal processing. Using speech processing as a primary example, they learn about: 1. A/D conversion 2. Segmentic analysis 5. Segmentic analysis 5. Segmentic analysis 6. Discourse analysis 6. Discourse analysis 6. Discourse analysis 6. Discourse analysis 7. 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 des	ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
1 semester graduate Contents Contents 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 of the input and to execute the desired interaction. In multimodal systems, this process is interlea- wed 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: 1.A/D conversion 2. Segmentation - 3. Syntactical analysis - 4. Semantic analysis - 5. Pragmatic analysis - 6. Discourse analysis - 7. Somenet multimodal interfaction. Interrelations are highlighted and consequences for an algorithmic processing are derived. Prominent multimodal integration (aka multimodal fusion) approaches are described, in cluding transducers, state machines, and unification. Interded learning outcomes - After the course, the students will be able to build their own multimodal interfaces. They will have a broad understanding of all the necessary steps involved and will know prominent algorithmic solutions for each of them. Student will learn about available tools for reoccuring tasks and their pros and cons. Courses (type, number of weekly contact	5	nume	rical grade			
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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 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 multimodal input. The course will highlight typical stages in multimodal processing. Using speech processing as a primary example, they learn about: A/D conversion Segmentation Segmen	1 seme	ster	graduate			
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After the course, the students will be able to build their own multimodal interfaces. They will have a broad under- standing of all the necessary steps involved and will know prominent algorithmic solutions for each of them. Stu- dent will learn about available tools for reoccurring tasks and their pros and cons. Courses (type, number of weekly contact hours, language – if other than German) V V (2) + Ü (2) Wethod of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) presentation of project results (approx. 40 minutes) 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): HCI,GE. Workload	 ze, 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 multimodal 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 Semantic analysis Pragmatic analysis Aspecific 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, in- 					
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V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) presentation of project results (approx. 40 minutes) 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): HCI,GE. Workload	standin	g of all	the necessary steps invo	olved and will know p	prominent algorithmi	c solutions for each of them. Stu-
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) presentation of project results (approx. 40 minutes) 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): HCI,GE. Workload	Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
module is creditable for bonus) presentation of project results (approx. 40 minutes) 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): HCI,GE. Workload	V (2) +	Ü (2)				
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): HCI,GE. Workload				ge — if other than German, e	examination offered — if no	t every semester, information on whether
Additional information Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI,GE. Workload	Langua credital	ge of a ole for	ssessment: German and, bonus			
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI,GE. Workload	Allocat	ion of p	olaces			
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI,GE. Workload						
HCI,GE. Workload						
			able for students of the N	laster's programme li	nformatik (Computer	Science, 120 ECTS credits):
150 h	Worklo	ad				
	150 h					

Teaching cycle

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)

Module	e title				Abbreviation	
Computability Theory 10-I=BER-161-m01						
Module	e coord	inator		Module offered by	<u> </u>	
		es Informatik (Compute	er Science)	Institute of Comput	er Science	
ECTS	1	od of grading	Only after succ. cor	1		
	1	rical grade				
5 Duratio		Module level	Other prerequisites			
	-					
1 seme		graduate				
Conten						
			ions, decidable and co ability, Turing reductio			
Intend	ed lear	ning outcomes				
ons, de	ecidabl	e and countable sets, I	l and applicable knowl nalting problem, m-red degrees, arithmetic hie	ucibility, creative and		
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether
	-	nation (approx. 60 to 1				
prox. 1 Langua credita	5 minut	es per candidate). ssessment: German ar bonus	ápprox. 20 minutes) o nd/or English			
Allocul						
Additic	nal inf	ormation				
Focuse	es availa	able for students of the	Master's programme l	nformatik (Compute	r Science, 120 ECTS o	credits):
Worklo	T,IS,GE					
	au					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
Module	e appea	urs in				
	-	ee (1 major) Computer				
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)						
		ee (1 major) Computer			D) (2010)	
1		ee (1 major) Computer				
1	-		onal Mathematics (201	.9)		
Master	's degr	ee (1 major) Mathemat	ics (2019)			
Master's w	vith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • ord Master (120 ECTS) Informa		page 45 / 119



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)

Module title Abbreviation						
Bioinfo	ormatic	S			07-Bl-161-m01	
Module	e coord	inator		Module offered by	<u>.</u>	
holder	of the (Chair of Bioinformatics		Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. con	·		
5	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme						
	Contents					
-						
		principles of bioinform	atics.			
		ning outcomes				
Studen	ts are p	proficient in methods for	or the analysis of DNA a	ind protein database	es.	
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		Sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
		nation (approx. 60 to 1: by the lecturer at the b		the written examina	tion may be replaced	d by an oral
		of one candidate each (
prox. 1	5 minut	es per candidate).			0	
		ssessment: German ar	ıd/or English			
credita	ble for	bonus				
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
	_					
Worklo	ad					
150 h						
Teachi	ng cycl	e				
	is eyer					
Referre	d to in	LPOI (examination regulati	ons for teaching-degree progra	mmes)		
				inines)		
Modula		are in				
Module						
	-	ee (1 major) Computer :				
	-	ee (1 major) Mathemati ee (1 major) Computati		6)		
	-	ee (1 major) Computer :		0)		
	-					
Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)						
Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) 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)					- /
		ee (1 major) Computati				
	-	ee (1 major) Mathemati				
	-	ee (1 major) Computati		4)		
		ee (1 major) Mathemati				
Master's wi	ith 1 maio	r Computer Science (2016)	IMU Würzbı	Irg • generated 19-Apr-2025 •	• exam.	page 47 / 119
				rd Master (120 ECTS) Informa		,,,



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)

Module title Abbreviation						
Compiler Construction 10-I=CB-161-m01						
Module	e coord	inator		Module offered by	_	
holder	of the (Chair of Computer Scier	nce II	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		1			
		is, syntactic analysis, s	emantics, compiler ge	nerators, code gener	ators, code optimisa	ation.
		ning outcomes	<u></u>			
The stu They ar	dents e able	possess knowledge in t to perform transformati generators.				
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
Method	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
module is	creditab	le for bonus)				
lf anno examin prox. 15	unced ation c 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (res per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) or			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
	s availa	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachi	ng cvcl	e				
	<u> </u>					
Referre 	d to in	LPO I (examination regulation	ons for teaching-degree progra	immes)		
Module	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 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 degree (1 major) Information Systems (2019)						
Master's wi	ith 1 majo	r Computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 49 / 119

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) Computational Mathematics (2022) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Mathematics (2022) 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 with 1 major Computer Science (2016)

Module	title				Abbreviation
Deducti	ive Dat	abases			10-I=DDB-161-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)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
		mantics of logic program or Datalog; negation and			d applications for Prolog; analyti-
Intende	ed learn	ning outcomes			
The stu	dents p	oossess expertise in work	king with Prolog and I	Datalog (including n	egation and disjunction).
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (4) + ĺ	Ü (2)				
		e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
examin prox. 15	ation o ; minut ge of a	f one candidate each (ap es per candidate). ssessment: German and/	prox. 20 minutes) or		tion may be replaced by an oral in groups of 2 candidates (ap-
Allocati	ion of p	olaces			
		ormation			
Focuses		able for students of the M	laster's programme li	nformatik (Computer	Science, 120 ECTS credits):
Worklo	ad				
240 h					
Teachin	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master' Master' Master' Suppler Master'	s degre s degre s teach mentar s degre	ee (1 major) Computer Sc ee (1 major) Mathematics ee (1 major) Computation ning degree Gymnasium I y course MINT Teacher Ec ee (1 major) Computation ee (1 major) Mathematics	(2016) al Mathematics (2014 MINT Teacher Educati ducation PLUS, Elite M al Mathematics (2014	on PLUS, Elite Netwo Network Bavaria (EN	

Module	e title				Abbreviation	
E-Learr	ning				10-I=EL-161-m01	
Module	e coord	linator		Module offered by		
holder	ofthe	Chair of Computer Scie	nce VI	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5		rical grade		• • • •		
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate				
Conten						
intellig	Learning paradigms, learning system types, author systems, learning platforms, standards for learning systems, intelligent tutoring systems, student models, didactics, problem-oriented learning and case-based training systems, adaptive tutoring systems, computer-supported cooperative learning, evaluation of learning systems.					
Intend	ed lear	ning outcomes				
The stu plicatio		possess a theoretical a	nd practical knowledge	e about eLearning an	d are able to assess	possible ap-
Course	S (type,	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
	age of a	tes per candidate). Issessment: German ar bonus	nd/or English			
Allocat	ion of	places				
Additio	onal inf	ormation				
Focuse SE,IT,IS		able for students of the E	Master's programme I	nformatik (Compute	r Science, 120 ECTS (credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
Module	e appe	ars in				
		ee (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)					
						016)
	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computer Science (2017)					
	Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)					
	-	ee (1 major) Computati		9)		
Master	's degr	ee (1 major) Mathemati	ics (2019)			
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 (rd Master (120 ECTS) Informa		page 52 / 119

Master's degree (1 major) Media Communication (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)

Module	title				Abbreviation		
Introdu	Introduction into Human-Computer Interaction 10-I=HCI-161-m01						
Module	coord	inator		Module offered by			
holder	of the (Chair of Computer Scier	nce IX	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio		Module level	Other prerequisites				
1 semes	ster	graduate	 				
Conten		0					
puting s introdu user an existing The cou ve syste niques, desktop	Human-Computer Interaction is concerned with the design, evaluation and implementation of interactive com- puting systems for human use and with the study of major phenomena surrounding them. This course gives an introduction into the principle biological, physiological, and psychological constraints as defined by the human user and relates these constraints to the conceptual and technical solutions of today's computer systems and existing as well as prospective interaction metaphors between humans and computers. The course covers topics about human perception and cognition, memory and attention, the design of interacti- ve systems, prominent evaluation methods, the principles of computer systems, typical input processing tech- niques, interface technology, and examples of typical interaction metaphors, from text-based input to graphical desktops to multimodal interfaces. Accompanying lab-work will introduce students to typical tasks involved in this field, i.e., prominent evaluation methods and prototyping of interfaces.						
comput	er syst	se, the students will ha tems. They will underst e necessary steps appl	and the constraints and	d capabilities of curr	ent user interfaces a		
Course	5 (type, r	number of weekly contact hour	s, language — if other than Ger	man)			
V (3) + ĺ	Ü (1)						
Method	l of ass	sessment (type, scope, lang	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether	
module is	creditab	le for bonus)					
	ge of a	of project results (appro ssessment: German an bonus					
Allocati	ion of p	olaces					
Additio	nal inf	ormation					
Focuses	s availa	able for students of the	Master's programme li	nformatik (Computer	Science, 120 ECTS of	redits): HCI.	
Worklo				× 1	,	,	
150 h							
Teachir	ng cycl	۹	-				
reachin	is cycl						
Doforro	d to in						
Referre		LPO I (examination regulation	ons for teaching-degree progra	mmes)			
Module			Science (accd)				
	-	ee (1 major) Computer ! ee (1 major) Digital Hun					
	-	ee (1 major) Digital Hull					
	-	ee (1 major) Computer S					
	-	ning degree Gymnasiun		ion PLUS. Flite Netwo	ork Bavaria (FNR) (20	020)	
		y course MINT Teacher					
		r Computer Science (2016)	JMU Würzbu	rg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa	exam.	page 54 / 119	



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)

Module	e title				Abbreviation	
Embedded Systems 10-I=ES-161-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
system	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.					
Intende	ed lear	ning outcomes				
	nportar	are familiar with the tech ht techniques for the mod	•	-		
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (4) +	Ü (2)					
		eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	on on whether
examin prox. 1	ation c 5 minut 1ge of a	by the lecturer at the beg if one candidate each (ar ies per candidate). ssessment: German and, bonus	oprox. 20 minutes) or			
Allocat	ion of p	olaces				
		ormation				
	s availa	able for students of the N	laster's programme li	nformatik (Computer	Science, 120 ECTS o	credits):
Worklo						
240 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	irs in				
Master	's degr	ee (1 major) Computer Sc	ience (2016)			
	Master's degree (1 major) Mathematics (2016)					
Master's degree (1 major) Computational Mathematics (2016)						
		ning degree Gymnasium				016)
		y course MINT Teacher E		Network Bavaria (EN	B) (2016)	
	-	ee (1 major) Computer Sc				
	-	ee (1 major) Computer Sc		`		
	-	ee (1 major) Computation		9)		
		ee (1 major) Mathematics		Irg • generated 19-Apr-2025 •	exam	page 56 / 119
				rd Master (120 ECTS) Informa		Page 10 / 119

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 (2022) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Aerospace Computer Science (2023)

Module title				Abbreviation				
Analysis and Design of Programs 10-I=PA-161-m01								
Module	e coord	inator		Module offered by				
holder	of the (Chair of Computer Scie	nce II	II Institute of Computer Science				
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)				
5		rical grade		•				
Duratio		Module level	Other prerequisites					
1 seme		graduate						
Conten		Sidudic						
	Program analysis, model creation in software engineering, program quality, test of programs, process models.							
			sontware engineering, p	fogram quality, test	of programs, proces	s models.		
		ning outcomes						
The stu quality		are able to analyse pro	grams, to use testing fr	ameworks and metri	cs as well as to judg	e program		
Course	S (type, r	number of weekly contact hour	s, language — if other than Ger	rman)				
V (2) +	Ü (2)							
		sessment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether		
lf anno examin prox. 15	unced ation c 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the bo of one candidate each (ses per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) or					
Allocat	ion of p	olaces						
Additio	nal inf	ormation						
	s availa	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	credits):		
Worklo								
150 h		-						
		•						
Teachi	ig cyci	e						
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)				
Module	e appea	urs in						
	-	ee (1 major) Computer S						
	-	ee (1 major) Mathemati						
Master's degree (1 major) Physics (2016)								
Master's degree (1 major) Nanostructure Technology (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)								
		-		Network Bavaria (EN	B) (2016)			
		ee (1 major) Computer S						
	Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)							
	-	ee (1 major) Mathemati		וד				
	5 4051							
Master's wi	ith 1 majo	r Computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 58 / 119		

Master's degree (1 major) Information Systems (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) 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) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022)

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

Module title				Abbreviation				
Informa	Information Retrieval 10				10-l=IR-161-m01			
Module	e coord	inator		Module offered by				
Dean of	f Studi	es Informatik (Compute	er Science)	Institute of Comput	er Science			
ECTS	Meth	od of grading	Only after succ. con	Only after succ. compl. of module(s)				
5		rical grade		•				
Duratio		Module level	Other prerequisites	i				
1 seme		graduate						
Conten		Sidduite						
IR models (e. g. Boolean and vector space model, evaluation), processing of text (tokenising, text properties), data structures (e. g. inverted index), query elements (e. g. query operations, relevance feedback, query langua- ges and paradigms, structured queries), search engine (e. g. architecture, crawling, interfaces, link analysis), me- thods to support IR (e. g. recommendation systems, text clustering and classification, information extraction).								
Intende	ed lear	ning outcomes						
		possess theoretical an know-how to create a s		n the area of informa	ation retrieval and ha	ave acquired		
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)				
V (2) +		·						
Method	d of ass	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether		
examin prox. 15	ation o 5 minut ge of a	by the lecturer at the b of one candidate each (tes per candidate). ssessment: German ar bonus	approx. 20 minutes) or					
Allocat	ion of _l	olaces						
Additio	nal inf	ormation						
Focuse: IT,IS,HC		able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits):		
Worklo	ad							
150 h			,,					
Teachir	ng cvcl	e						
	0.7							
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	ammec)				
	<u>u co m</u>							
Module	annea	ars in						
Module appears in Master's degree (1 major) Computer Science (2016)								
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) Digital Humanities (2016)								
		hing degree Gymnasiur				016)		
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)								
Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)								
	-			a)				
		ee (1 major) Computati		9) Jrg • generated 19-Apr-2025 •	exam.	page 60 / 119		
	,-			rd Master (120 ECTS) Informa				

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)

Module title					Abbreviation		
3D User	Interfac	:es			10-HCI=3DUI-161-m	01	
Module	coordin	ator		Module offered by			
holder of	f the Ch	air of Computer Scier	ice IX	Institute of Comput	er Science		
ECTS I	Method	of grading	Only after succ. con	Only after succ. compl. of module(s)			
5 r	numerio	al grade					
Duration Module level Other prerequisites							
1 semester graduate							
Contents	s						
This module will give students the opportunity to learn about the specificities of 3D User Interfaces (3DUI) deve- lopment using Virtual, Augmented or Mixed Reality technologies. The module content will be mainly dedicated to learn and practice the skills essential to the design and implementation of high-quality 3D interaction techni- ques. Design guidelines as well as classical and innovative 3D Interaction techniques will be studied. In additi- on, the course will address novel research themes such as 3D interaction for large displays and games; and in- tegrating 3DUIs with mobile devices, robotics, and the environment. Students will be assessed through a group practical project (team work), which will consist of a program, a presentation, a technical report (2 ages) and a vi- deo. Previous years, the assignment replicated the IEEE 3DUI Contest 2011, where teams of students competed between each other to find the best solution (see results at https://www.youtube.com/watch?v=gYs-pBW7Agc and https://www.youtube.com/watch?v=gYs-pBW7Agc)							
Intended	d learni	ng outcomes					
spatial ir spatial ir	After the course, the students will gain a solid background on the theory and the methods to create your own 3D spatial interfaces. They will have a broad understanding of the particular difficulties of designing and developing spatial interfaces, as well as evaluating then. Students will also learn about traditional and novel 3D input/output devices (e.g., motion tracking system and Head-mounted Display).						
Courses	(type, nur	nber of weekly contact hours	, language — if other than Gei	rman)			
V (2) + Ü	(2)						
Method module is c			uage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
•	ge of ass	project results (appro sessment: German an onus	-				
Allocatio	on of pla	aces					
Addition	nal infor	mation					
Focuses HCI,GE.	availab	le for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	redits):	
Workloa	d						
150 h							
Teaching	g cycle						
-							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
§ 22 Ni							
Module a	appears	s in					
Master's Master's	Module appears inMaster'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 with	h 1 major Co	omputer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 62 / 119	

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

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

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

Julius-Maxi

UNIVERSITÄT

WÜRZBURG

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)

Module title					Abbreviation			
Compu	tationa	al Complexity II			10-l=KT2-161-m01			
Module	e coord	inator		Module offered by				
Dean o	f Studi	es Informatik (Compute	r Science)					
ECTS		od of grading		Only after succ. compl. of module(s)				
	1	rical grade						
5								
Duratio		Module level	Other prerequisites	•				
1 seme		graduate						
Conten								
	Properties of NP-complete sets, autoreducibility, interactive proof systems, polynomial time hierarchy, complexi- ty of probabilistic algorithms.							
Intende	ed lear	ning outcomes						
		possess a fundamental ty, interactive proof sys						
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)				
V (2) +	Ü (2)							
		Sessment (type, scope, lang ole for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether		
lf anno examin prox. 15	unced ation o 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (tes per candidate). ssessment: German an bonus	eginning of the course, approx. 20 minutes) o					
Allocat		-						
Additio	nalinf	ormation						
	s avail	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits): AT,		
Worklo								
150 h								
Teachi		e						
 Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progr	ammes)				
Module	e appea	ars in						
Master	's degr	ee (1 major) Computer S	Science (2016)					
	-	ee (1 major) Mathemati						
		ee (1 major) Computati		.6)				
Master	's teac	hing degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)		
Supple	menta	ry course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2016)			
Master	's degr	ee (1 major) Computer S	Science (2017)					
Master	's degr	ee (1 major) Computer S	Science (2018)					
Master	's degr	ee (1 major) Computatio	onal Mathematics (201	19)				
	-	ee (1 major) Mathemati	•					
Master	's teac	hing degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	020)		
Master's wi	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • ord Master (120 ECTS) Informa		page 64 / 119		



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

Master's with 1 major Computer Science (2016)

Module title					Abbreviation	
Artifici	Artificial Intelligence 1 10-I=Kl1-161-mo1					
Module	e coord	inator		Module offered by		
holder	ofthe	Chair of Computer Scier	nce VI	Institute of Comput	er Science	
ECTS		od of grading	Only after succ. con			
	1	rical grade				
5 Duratio		Module level	Other prerequisites			
		_	Other prerequisites	1		
1 seme		graduate				
Conten						
	Intelligent agents, uninformed and heuristic search, constraint problem solving, search with partial information, propositional and predicate logic and inference, knowledge representation.					
Intende	ed lear	ning outcomes				
		possess theoretical and gic and are able to asse			gence in the area of	agents,
Course	S (type, 1	number of weekly contact hours	, language — if other than Ge	rman)		
V (2) +						
Metho	d of as	s essment (type, scope, lang ble for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
If anno examin prox. 19 Langua credita	unced ation o 5 minu 1ge of a ble for		eginning of the course, approx. 20 minutes) or			
Allocat	ION OF	places				
		ormation				
Focuse AT,SE,I		able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ummes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Computer S	Science (2016)			
Master	's degr	ee (1 major) Mathemati	cs (2016)			
Master	's degr	ee (1 major) Physics (20	016)			
Master	's degr	ee (1 major) Nanostruct	ure Technology (2016)			
Master	's degr	ee (1 major) Computatio	onal Mathematics (201	6)		
Master	's teac	hing degree Gymnasiun	n MINT Teacher Educat	ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)
Supple	menta	ry course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2016)	
Master	's degr	ee (1 major) Computer S	Science (2017)			
Master	's degr	ee (1 major) Computer S	Science (2018)			
Master	's degr	ee (1 major) Computatio	onal Mathematics (201	9)		
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 66 / 119

Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Information Systems (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) 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) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) Master's degree (1 major) Quantum Technology (2021)

Module title				Abbreviation			
Artifici	al Intel	ligence 2			10-l=Kl2-161-m01		
Module	e coord	linator		Module offered by			
holder	of the	Chair of Computer Scie	nce VI	VI Institute of Computer Science			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5		rical grade		•			
Duratio		Module level	Other prerequisites	6			
1 seme	ster	graduate					
Conten	its		- I				
Planning, probabilistic closure and Bayesian networks, utility theory and decidability problems, learning from observations, knowledge while learning, neural networks and statistical learning methods, reinforcement lear- ning, processing of natural language.							
Intend	ed lear	ning outcomes					
		possess theoretical and ing and language proce				probabilistic	
Course	S (type, 1	number of weekly contact hour	s, language — if other than Ge	rman)			
V (2) +	Ü (2)						
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether	
	age of a ble for		nd/or English				
Additio	onal inf	ormation					
	s avail	able for students of the	Master's programme I	nformatik (Compute	r Science, 120 ECTS (credits):	
Worklo		-					
150 h							
Teachi	ng cycl	e					
	<u> </u>						
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)			
				· · · · ·			
Module	e appea	ars in					
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)						
		hing degree Gymnasiur				016)	
	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computer Science (2017)						
	Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)						
	-	ree (1 major) Computati		9)			
Master	's degr	ee (1 major) Mathemat	ics (2019)				
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 (rd Master (120 ECTS) Informa		page 68 / 119	

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) Aerospace Computer Science (2020)

Module title					Abbreviation	
Perforn	nance l	Evaluation of Distribute	d Systems		10-l=LVS-161-m01	
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scier	nce III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
8	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ster	graduate	 			
Conten		0				
Traffic theoretic models, fundamental concepts of theory of probability, transformation techniques, stochastic processes, methods for performance analysis of technical systems, queue-/traffic theory, analysis of Markov, non-Markov and time critical systems, matrix analytical method, practical examples for performance analysis of computer systems and networks: throughput and goodput analysis and other characteristics.						
Intende	ed lear	ning outcomes				
		possess the methodic k theory of probability an			y to model technica	l systems by
		number of weekly contact hours				
V (4) +			· · · · · · · · · · · · · · · · · · ·	-		
Method	d of ass	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	on on whether
prox. 19 Langua credita	5 minut ge of a ble for					
Allocat	ion of _l	olaces				
	s availa	ormation able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS (credits):
Worklo						
240 h						
Teachi	ng cvcl	e				
	0 .)	-				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module	appea	ars in				
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's degree (1 major) Computer Science (2018)						
Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)						
	-	ee (1 major) Mathemati		<i>, , , , , , , , , ,</i>		
		r Computer Science (2016)	JMU Würzbı	rrg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 70 / 119



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

Module title					Abbreviation		
Mathe	matica	Logic			10-l=ML-161-m01		
Modul	e coord	inator		Module offered by			
Dean o	of Studi	es Informatik (Compute	er Science)	· · · · · · · · · · · · · · · · · · ·			
ECTS	1	od of grading	Only after succ. con	· ·			
5	1	rical grade					
Duratio		Module level	Other prerequisites				
				•			
1 seme		graduate					
Conter		le sie finst and an ana die		duation. Cädalla oon		Ta valvi the a a	
rem, G	ödel's i	logic, first-order predic ncompleteness theorem					
Intend	ed lear	ning outcomes					
predica	ate logi	possess a fundamental c, proof and deduction ecidability and nonaxio	, Gödel's completenes	s theorem, Tarski the			
Course	S (type, 1	number of weekly contact hour	s, language — if other than Ge	rman)			
V (2) +	Ü (2)						
		sessment (type, scope, lang ble for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
prox. 1 Langua	5 minu	of one candidate each (tes per candidate). Issessment: German an bonus				luttes (up	
Allocat	tion of	places					
Additio	onal inf	ormation					
Focuse AT,SE,I		able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS o	credits):	
Worklo							
150 h							
_	ng cycl	e					
	0.7						
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
Modul	e anne:	ars in					
Module appears in Master's degree (1 major) Computer Science (2016)							
	-	ee (1 major) Mathemati					
Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Computational Mathematics (2016)							
1		hing degree Gymnasiun				016)	
		ry course MINT Teacher		Network Bavaria (EN	B) (2016)		
	-	ee (1 major) Computer S					
1	-	ee (1 major) Computer ! ee (1 major) Computatio		ი)			
1	-	ee (1 major) Computationee (1 major) Mathemati		7/			
	_						
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 72 / 119	



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)

Module title				Abbreviation		
Medical Informatics 10-I=MI-161-m01						
Module coordinator			Module offered by			
holder of the Chair of Computer Science VI			Institute of Comput	er Science		
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio		Module level	Other prerequisites			
1 seme	ester	graduate				
Conten	nts	10				
		ient folder, coding of m	edical data, hospital in	nformation systems.	operation of comput	ters in infir-
mary a	nd fund	ctional units, medical d case-based training sys	ecision making and as	sistance systems, st		
Intend	ed lear	ning outcomes				
The stu medici		possess theoretical and	d practical knowledge a	about the application	n of computer scienc	e methods in
Course	S (type, 1	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		Sessment (type, scope, lang ole for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether
Langua credita	age of a ble for		d/or English			
Allocat	tion of	places				
Additio	onal inf	ormation				
	es avail S,HCI,G	able for students of the E	Master's programme I	nformatik (Computer	r Science, 120 ECTS (credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	immes)		
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 Cympasium MINT Teacher Education DLUS, Elite Naturerk Pavaria (ENP) (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'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 degr	ee (1 major) Mathemati	cs (2019)			
Master's w	ith 1 majo	r Computer Science (2016)		urg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 74 / 119



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)

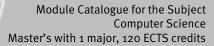
Module title			Abbreviation			
Performance Engineering & Benchmarking of Computer Systems			10-I=PEB-161-m01			
Module coordinator				Module offered by		
holder	of the (Chair of Computer Scier	nce II	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
		o performance engineer arking of commercial s				
Intende	ed lear	ning outcomes				
ment te	echniqu	possess a fundamental ues, multi-factorial varia ks, modelling methods	ance analysis, data ana	lysis with R, benchn	nark approaches, mo	
Course	S (type, r	number of weekly contact hours	, language — if other than Ger	man)		
V (2) +	Ü (2)					
		sessment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
examin prox. 1	ation c 5 minut ge of a	by the lecturer at the be of one candidate each (a ces per candidate). ssessment: German an bonus	approx. 20 minutes) or			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuse SE,IT,E		able for students of the E	Master's programme li	nformatik (Computer	Science, 120 ECTS o	redits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
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's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)						
	Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)					
Master	's degr	ee (1 major) Mathemati	cs (2019)			
Master's wi	th 1 maio	r Computer Science (2016)	IMII Wijirzbu	rg • generated 19-Apr-2025 •	exam.	page 76 / 119
				rd Master (120 ECTS) Informa		F-02/0/117

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) Aerospace Computer Science (2020)

Module title Abbreviation						
Professional Project Management 10-I=PM-161-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 Simultaneous completion of module 10-I=PRJ is recommended.						
Contents						
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, projects; agile project management/SCRUM, combination of classic and agile methods.						
Intended learning outcomes						
The students possess practically relevant knowledge about the topics of production management and/or propect management. They are familiar with the critical success criteria and are able to initiate, d plan, control and review projects.						
Courses (type, number of weekly contact hours, language — if other than German)						
V (2)						
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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						
Additional information						
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits IT, IS, ES, LR, HCI.): SE,					
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Media Communication (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)	<u> </u>					
Master's with 1 major Computer Science (2016) JMU Würzburg • generated 19-Apr-2025 • exam. page 7 reg. data record Master (120 ECTS) Informatik - 2016 reg. data record Master (120 ECTS) Informatik - 2016 page 7	78 / 119					





Master's degree (1 major) Media Communication (2018) Master's degree (1 major) Media Communication (2019)

Module title				Abbreviation		
Computer Arithmetic 10-I=RAM-161-m01						
Module coordinator			Module offered by	L		
holder	of the	Chair of Computer Scie	nce II	Institute of Comput	er Science	
ECTS	1	od of grading	Only after succ. con	· · ·		
5	1	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten		10	1			
Spaces	s of nur	nerical computation, ra al calculation.	ster and rounding, def	inition and impleme	ntation of computati	onal arithme-
Intend	ed lear	ning outcomes				
	pleme	possess knowledge ab ntation of computation	•	•		
Course	S (type,	number of weekly contact hour	s, language — if other than Ge	rman)		
V (2) +	Ü (2)					
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
prox. 1	5 minu age of a	of one candidate each (tes per candidate). assessment: German ar bonus		an oral examinatior	in groups of 2 cand	idates (ap-
Allocat	tion of	places				
Additio	onal inf	ormation				
Focuse AT,ES	es avail	able for students of the	Master's programme I	nformatik (Compute	Science, 120 ECTS o	credits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
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 Cympasium MINT Teacher Education DUUS, Elite Naturerk Pavaria (ENP) (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's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018)						
1	Master's degree (1 major) Computational Mathematics (2019)					
Master	's degr	ee (1 major) Mathemati	ics (2019)			
Master's w	ith 1 majo	or Computer Science (2016)		urg • generated 19-Apr-2025 « rd Master (120 ECTS) Informa		page 80 / 119

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) Computational Mathematics (2022)

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

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)

Module title				Abbreviation			
Robotics 1				10-l=R01-152-m01			
Module	e coord	inator		Module offered by			
holder	of the (Chair of Computer Scien	ce XVII	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
8		rical grade	 	•			
Duratio		Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
homogo tor cont Worksp se dyna lonome	History, applications and properties of robots, direct kinematics of manipulators: coordinate systems, rotations, homogenous coordinates, axis coordinates, arm equation. Inverse kinematics: solution properties, end effector configuration, numerical and analytical approaches, examples of different robots for analytical approaches. Workspace analysis and trajectory planning, dynamics of manipulators: Lagrange-Euler model, direct and inverse dynamics. Mobile robots: direct and inverse kinematics, propulsion system, tricycle, Ackermann steering, holonomes and non-holonome restrictions, kinematic classification of mobile robots, posture kinematic model. Movement control and path planning: roadmap methods, cell decomposition methods, potential field methods.						
	-	ning outcomes					
The stu	dents i	master the fundamental cs and dynamics as wel				niliar with	
		number of weekly contact hours					
V (4) +		,					
		Sessment (type, scope, langu	age — if other than German	examination offered — if no	t every semester informati	ion on whether	
		le for bonus)			revery semester, mornal		
written credita		nation (approx. 60 to 90 bonus	minutes)				
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Focuse: IS,ES,LI		able for students of the	Master's programme l	nformatik (Computer	r Science, 120 ECTS o	credits):	
Worklo	ad						
240 h							
Teachir	ıg cycl	e					
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)			
§ 22 II Nr. 3 b)							
Module appears in							
Master's degree (1 major) Space Science and Technology (2015)							
First state examination for the teaching degree Gymnasium Computer Science (2015)							
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) Satellite Technology (2018)						
Master's wi	th 1 majo	r Computer Science (2016)		ırg ● generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 82 / 119	



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

Module title				Abbreviation		
Robotics 2				10-l=RO2-152-m01		
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scier	ice XVII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		-			
feedba stems:	ck and founda	f dynamic systems, cor feed-forward, state obs ations of stochastics, ra lication examples, prob	erver, feedback with s ndom processes, stoc	tate observer, time o hastic dynamic syste	liscrete systems, sto ems, Kalman filter: d	ochastic sy-
Intende	ed lear	ning outcomes				
tions of se the c	f roboti connec	master all fundamental cs. The students posse tions between the dual also recognise the relati	ss a knowledge of adv pairs controllability - c	anced controller and observability as well	l observer methods a as controller design	and recogni- and observer
		number of weekly contact hours	, language — if other than Ger	rman)		
V (4) +	Ü (2)					
		essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informati	on on whether
written credital		nation (approx. 60 to 90 bonus	o minutes)			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Focuses ES, LR	s availa	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS (credits): IT,
Worklo	ad					
240 h						
Teachir	ıg cycl	e				
	<u> </u>					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	immes)		
§ 22						
Module						
Master's degree (1 major) Space Science and Technology (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) 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's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)						
				-	avam	
waster's wi	ın 1 majoi	r Computer Science (2016)		urg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 84 / 119



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)

Module title				Abbreviation		
Discrete Event Simulation				10-I=ST-161-m01		
Module	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)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten		0				
bles, ra measui limits o project	indom red dat of mode s.	o simulation techniques sample theory and estir a, planning and evaluat el creation and simulatio	nation techniques, sta ion of simulation expe	tistical analysis of si riments, special ran	imulation values, ins dom processes, pos	spection of sibilities and
Intende	ed lear	ning outcomes				
	cal) sys	possess the methodic k stems, the evaluation of s.				
Course	S (type, r	umber of weekly contact hours	, language — if other than Gei	man)		
V (4) +	Ü (2)					
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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						
credita Allocat						
			_			
Additio	nalinf	ormation				
	s availa	able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECTS (credits):
Worklo	ad					
240 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)		
Module appears in						
Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Mathematics (2016)						
	-	ee (1 major) Computatio				
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)						
	-	ee (1 major) Computer S		ira a apported to Arrass	a avam	page 96 /
master S WI	ur i majo	computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 86 / 119

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) Aerospace Computer Science (2020) Master's degree (1 major) eXtended Artificial Intelligence (xtAl) (2020)

Module	e title				Abbreviation	
Real-Time Interactive Systems					10-HCI=RIS-161-m01	
Module	e coord	inator		Module offered by		
holder	ofthe	Chair of Computer Scienc	e IX	Institute of Comput	ter Science	
ECTS	Methe	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					
This course provides an introduction into the requirements, concepts, and engineering art of highly interactive human-computer systems. Such systems are typically found in perceptual computing, Virtual, Augmented, Mixed Reality, computer games, and cyber-physical systems. Lately, these systems are often termed Real-Time Interactive Systems (RIS) due to their common aspects. The course covers theoretical models derived from the requirements of the application area as well as common hands-on and novel solutions necessary to tackle and fulfill these requirements. The first part of the course will concentrate on the conceptual principles characterizing real-time interactive systems. Questions answered are: What are the main requirements? How do we handle multiple modalities? How do we define the timeliness of RIS? Why is it important? What do we have to do to assure timeliness? The second part will introduce a conceptual model of the mission-critical aspects of time, latencies, processes, and events necessary to describe a system's behavior. The third part introduces the application state, it's requirements of distribution and coherence, and the consequences these requirements have on decoupling and software quality aspects in general. The last part introduces some potential solutions to data redundancy, distribution, synchronization, and interoperability. Along the way, typical and prominent state-of-the-art approaches to reoccurring engineering tasks are discussed. This includes pipeline systems, scene graphs, application graphs (aka field routing), event systems, entity and component models, and others. Novel concepts like actor models and ontologies will be covered as alternative solutions. The theoretical and conceptual discussions will be put into a practical context of today's commercial						
Intende	ed lear	ning outcomes				
physio gical ch can exp to solve	After the course, the students will have a solid understanding of the boundary conditions defined by both, the physiological and psychological characteristics of the human users as well as by the architectures and technological characteristics of today's computer systems. Participants will gain a solid understanding about what they can expect from today's technological solutions. They will be able to choose the appropriate approach and tools to solve a given engineering task in this application area and they will have a well-founded basis enabling them to develop alternative approaches for future real-time interactive systems.					
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (2) + Ü (2)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
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: German and/or English creditable for bonus					
Allocation of places						

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Additional information

Workload

150 h

Teaching cycle

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

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Module appears in

Master's degree (1 major) Computer Science (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) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019)

Module title				Abbreviation		
Software Architecture			10-I=SAR-161-m01			
Module coordinator			Module offered by			
holder	of the (Chair of Computer Scier	nce II	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		0				
tural st sed sof cloud-r model-	yles, so tware o ative a driven	o software architecture oftware components, in engineering, service-ori and serverless computin architecture	terface models and de ented architectures, m	sign guidelines, des icroservice architect	ign-by-contract, com ures, scalability of d	ponent-ba- atabases,
		ning outcomes				
		possess a fundamental n modern software arcl				
Course	S (type, r	number of weekly contact hour	s, language — if other than Ger	man)		
V (2) +	Ü (2)					
		sessment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
lf anno examin prox. 1	unced ation c 5 minut ge of a	nation (approx. 60 to 12 by the lecturer at the be of one candidate each (tes per candidate). ssessment: German an	eginning of the course, approx. 20 minutes) or			
Allocat						
Allocal		Jaces				
 A J J!4! -						
		ormation				
SE,IT,E		able for students of the	Master's programme I	nformatik (Computer	Science, 120 ECIS (credits):
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						
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's degree (1 major) Computer Science (2018)						
	-	r Computer Science (2016)		Irg • generated 19-Apr-2025 •	exam.	page 90 / 119
				rd Master (120 ECTS) Informa		F-0- 7- / 117

UNIVERSITÄT WÜRZBURG

Module studies (Master) Computer Science (2019) 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)

Module title				Abbreviation			
Spacecraft System Design					10-l=SSD-152-m01		
Module	coordi	nator		Module offered by			
holder	of the C	hair of Computer Scienc	e VII	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	numer	ical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts						
orbits, o angle o on of th lemetry	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, verificati- on of thermal designs. Telecommunication: ground contact analysis, data transmission, satellite monitoring (te- lemetry, telecommando). Structure and mechanisms. Energy systems: primary, secondary, management, power generation: solar cells. On-board data processing. Propulsion systems. Tests (mechanical, electrical). Operation						
		ning outcomes					
		naster system aspects of s and their integration in			g the example of spacecraft, ma-		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V (4) + l	Ü (2)						
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
written credital		nation (approx. 60 to 120 bonus	minutes)				
Allocati	ion of p	laces					
Additio	nal info	ormation					
Focuses LR	s availa	ble for students of the M	laster's programme Ir	nformatik (Computer	Science, 120 ECTS credits): ES,		
Worklo	ad						
240 h							
Teachir	ng cycle	9					
Referre	d to in	LPO I (examination regulations	s for teaching-degree program	mmes)			
§ 22 Nr. 3 b)							
Module appears in							
Master's degree (1 major) Space Science and Technology (2015) First state examination for the teaching degree Gymnasium Computer Science (2015) Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018) 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 with 1 major Computer Science (2016)

Module titl	е	Abbreviation			
Machine Learning (for User Interfaces) 10-HCI=MLUI-161-m01					
Module coordinator			Module offered by		
holder of th	e Chair of Computer Science	ce IX	Institute of Comput	er Science	
ECTS Me	thod of grading	Only after succ. con	npl. of module(s)		
5 nui	nerical grade				
Duration	Module level	Other prerequisites	;		
1 semester	graduate				
Contents					
Machine learning is the science of getting computers to act without being explicitly programmed. In the past de- cade, machine learning has given us practical speech recognition, effective web search, self-driving cars, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probab- ly use it dozens of times a day without knowing it. It is one of today's prominent paradigms in HCI applicable in all areas where the understanding of user input of high variability, specifically for natural interactions using, e.g., gesture, speech, or eye-gaze, is paramount. Many researchers also think it is the best way to make progress to- wards human-level Al. In this course, students will learn about the most effective machine learning techniques, and gain practice im- plementing them and getting them to work. Students not only learn the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems. Finally, they learn about some of Silicon Valley's best practices in innovation as it pertains to machine learning and Al. This course provides a broad introduction to machine learning, data-mining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, ker- nels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and Al). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building gesture-based and multimodal interfaces, text and speech under- standing (web search, anti-spam), smart robots (perception, control), computer vision, medical informatics, au-					
	se mining, and other areas parning outcomes				
After the co gies, e.g., l Students w rious applie	urse, the students will be a ke Octave. In addition, the ill be able to choose the ap cation area, specifically in F	y will be able to deriv propriate approach a ICI.	e main principles and and tools to solve a gi	eir own using assistive technolo- d apply these in own programs. iven machine learning task in va-	
	e, number of weekly contact hours,	language — if other than Ge	rman)		
V (2) + Ü (2)					
	assessment (type, scope, langua itable for bonus)	age — if other than German,	examination offered — if no	t every semester, information on whether	
presentation of project results (approx. 40 minutes) 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): HCI,GE.					
Workload					
150 h					

Master's with 1 major Computer Science (2016)

Teaching cycle

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

§ 22 II Nr. 3	; b)
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3 22 (114), 3 0)
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)

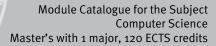
Module title				Abbreviation		
Visualization of Graphs					10-I=VG-161-m01	
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scienc	e l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		•			
<i>phenth</i> the pla	<i>eorie (/</i> nar sep	overs the most important Algorithmic Graph Theory parator theorem will be us prithms to optimise these	 v) such as divide and sed. We will become 	conquer, flow netwo	orks, integer program	nming and
Intende	ed lear	ning outcomes				
		its get an overview of gra ge about the modelling a				
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)		
V (2) +	Ü (2)					
		Sessment (type, scope, langua ile for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	on on whether
examin prox. 1	ation c 5 minut 1ge of a	by the lecturer at the beg of one candidate each (ap tes per candidate). ssessment: German and bonus	oprox. 20 minutes) or			
Allocat	ion of _J	olaces				
Additio	onal inf	ormation				
Focuse AT,IT,H		able for students of the N	laster's programme li	nformatik (Computer	Science, 120 ECTS o	redits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
§ 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's degree (1 major) Computer Science (2018) Master's degree (1 major) Computational Mathematics (2019)						
	-	ee (1 major) Mathematics		7/		
		r Computer Science (2016)	JMU Würzbu	rg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 95 / 119

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)

Module title				Abbreviation			
Interactive Computer Graphics				10-l=lCG-152-m01			
Module	e coord	inator		Module offered by			
holder	ofthe	Chair of Computer Scie	nce IX	Institute of Comput	er Science		
ECTS	Meth	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						
cifically conterr about l jection line wil	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/						
		ning outcomes					
compu	ter gra	the course, the student bhics. They will be able applications and to c	to implement a promir	nent variety of these			
Course	S (type, r	number of weekly contact hour	s, language — if other than Gei	rman)			
V (2) +	Ü (2)						
		Sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informati	on on whether	
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 _l	places					
Additio	nal inf	ormation					
Focuse HCI	Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI						
Workload							
150 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	Module appears in						
Bachel Bachel	or's de or's de	gree (1 major) Compute gree (1 major) Mathema gree (1 major) Computa ee (1 major) Computer	atics (2015) Itional Mathematics (20	D15)			
Master's w	ith 1 majo	r Computer Science (2016)		ırg ● generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 97 / 119	





Bachelor's degree (1 major) Computer Science (2017) Bachelor's degree (1 major) Computer Science (2019)

Module title				Abbreviation			
Space Systems Design					10-l=RSE-161-m01		
Module	coord	inator		Module offered by			
holder	of the O	Chair of Computer Science	e VIII	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
8	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts						
craftsys from the	stem is e area	done anew each semest	er and draws inspirat	ion from current trer	m. The selection of the space- nds and concrete research, often tion and observation of transient		
Intende	d lear	ning outcomes					
elemen help of	tary de the acc in the a	sign aspects, create requ quired knowledge of metl area of spacecraft system	uirements accordingly hods they are able to	y and consider them create dedicated to	ms. They are able to analyse the in their system design. With the ols and methods to support the opment of spacecraft systems		
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)			
R (3)							
		e ssment (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
Each pr same to Langua	oject is opic. As ge of a		he project will not be , only be offered for t or English	repeated; there will he project offered in	not be another project with the the respective semester.		
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): LR.		
Worklo	ad						
240 h							
Teaching cycle							
Referre	d to in	LPOI (examination regulations	for teaching-degree progra	mmes)			
Module appears in							
Master's degree (1 major) Computer Science (2016)							

Module title				Abbreviation		
Design of Planetary Bases and Orbital Stations					10-l=EPB-161-m01	
Module	coord	inator		Module offered by		
holder	of the O	Chair of Computer Science	e VIII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
plannin compor se etc) constru product	g of pl nents li The mo oction a tion, tra	anetary bases. This will the satellites. The contention of the satellites in the contention of the satellites in the satellites and operation scenarios,	rain the planning of a t will be decided upo e motivation, goals, p planning of modules	n very complex space n each semester (for prerequisites, constra and structures, lifes	cus on the special aspects of ecraft apart from its individual r example lunar base, mars ba- aints, environment, localization, upport, energy, communication, e of the moon will be conceptual-	
Intende	ed leari	ning outcomes				
le to an support the plar	alyse t t of the nning i	he elementary aspects of acquired knowledge of r	f planning, pose requ nethods they are abl ases and orbital stati	irements and considered to create dedicated	es and orbital bases. They are ab- der the system design. With the d tools and processes to support nagement for the development of	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R (3)						
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
project report (10 to 15 pages) and presentation of project (15 to 30 minutes) Each project is offered one time only. The project will not be repeated; there will not be another project with the same topic. Assessment can, therefore, only be offered for the project offered in the respective semester. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Focuses	Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): LR.					
Workload						
240 h						
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	ins in				
Master's degree (1 major) Computer Science (2016)						

Module title	Abbreviation					
Practical course - Rocket Engineering		10-I=PRT-161-m01				
Module coordinator		Module offered by				
holder of the Chair of Computer Scien	ce VIII	Institute of Comput	er Science			
ECTS Method of grading	Only after succ. con	npl. of module(s)				
5 (not) successfully completed						
Duration Module level	Other prerequisites					
1 semester graduate						
Contents						
In this internship, students are suppo analysis of rocket experiments (incluc periments and their payloads.						
Intended learning outcomes						
The students gain fundamental knowledge about the design of spacecraft experiments, fundamental knowled- ge about rocket science, including launch preparations as well as the execution. They are able to analyse the ele- mentary design aspects of rocket payloads, pose according requirements and respects those in the design. With the aid of the acquired methodic knowledge, they are able to apply dedicated tools and method in bigger pro- jects.						
Courses (type, number of weekly contact hours	language — if other than Ger	man)				
Р (3)						
Method of assessment (type, scope, langu module is creditable for bonus)	age — if other than German,	examination offered — if no	t every semester, information on whether			
placement report (4 to 5 pages) and p Language of assessment: German and		(15 to 30 minutes)				
Allocation of places						
Additional information						
Focuses available for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS credits): LR.			
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer S	cience (2016)					

Module title					Abbreviation	
Selected Topics in Algorithms 10-I=AKA-161-m01						
Module	e coord	inator		Module offered by		
holder	of the (Chair of Computer Scien	ce l	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		•			
		s in algorithmics.				
		ning outcomes				
		understand the basic ap		computor science. T	how are able to unde	victand the
		omplex problems in this		•		
Course	S (type, r	number of weekly contact hours	, language — if other than Gei	rman)		
V (2) +	Ü (2)					
		Sessment (type, scope, langule for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	on on whether
		nation (approx. 60 to 12 by the lecturer at the be	-	the written examination	tion may be replaced	d by an oral
		of one candidate each (a				
prox. 1	5 minut	es per candidate).				
		ssessment: German and	d/or English			
credita						
Allocat	ion of p	olaces	-			
Additio	nal inf	ormation				
Focuse AT	s availa	able for students of the	Master's programme l	nformatik (Computer	Science, 120 ECTS o	redits):
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)		
Module appears in						
Master	's degr	ee (1 major) Computer S	cience (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)						
	-	ee (1 major) Computer S	•	/		
Master's wi	th 1 majo	r Computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 102 / 119



Master's degree (1 major) Aerospace Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022)

Module title					Abbreviation		
Selected Topics in Theory 10-I=AKT-161-m01							
Module coordinator			Module offered by				
holder	of the (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	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten		0	_ <u>I</u>				
		s in theory.					
		ning outcomes					
		understand the basic a		computer science T	hev are able to unde	rstand the	
		omplex problems in this					
Course	S (type, r	umber of weekly contact hours	, language — if other than Ge	rman)			
V (2) +							
		sessment (type, scope, lang	uage — if other than German.	examination offered — if no	t every semester, informati	ion on whether	
		le for bonus)					
		nation (approx. 60 to 12					
		by the lecturer at the be					
		of one candidate each (a es per candidate).	approx. 20 minutes) or	an oral examination	in groups of 2 cand	idates (ap-	
		ssessment: German an	d/or English				
credita	-						
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Focuse: AT	s availa	able for students of the	Master's programme I	nformatik (Computer	r Science, 120 ECTS o	credits):	
Worklo	ad						
150 h							
Teachir	ng cvcl	e					
	0 . 7	2					
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)			
Module appears in							
	Master's degree (1 major) Computer Science (2016)						
Master's degree (1 major) Athematics (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 wi	ith 1 majo	r Computer Science (2016)		ırg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa		page 104 / 119	



Master's degree (1 major) Aerospace Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Mathematics (2022)

Module title				Abbreviation		
Selected Topics in Software Engineering					10-I=AKSE-161-m01	
Module	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. com	pl. of module(s)		
5	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Selecte	d topic	s in software engineering	5.			
Intende	ed learr	ning outcomes				
		bossess an advanced kno	wledge about select	ed aspects of softwa	are engineering.	
		umber of weekly contact hours, l		•	0 0	
V (2) + l				-		
Method	l of ass	e essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
lf annou examin prox. 15	unced l ation o 5 minut ge of a	f one candidate each (ap es per candidate). ssessment: German and/	inning of the course, pprox. 20 minutes) or		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 lr	nformatik (Computer	Science, 120 ECTS credits): SE.	
Worklo					· · ·	
150 h						
Teachir	ng cycl	9				
	<u> </u>					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
			0.001,00			
Module	appea	irs in				
	-	ee (1 major) Computer Sc				
		ning degree Gymnasium I				
		y course MINT Teacher Ed		Network Bavaria (ENI	B) (2016)	
	Master's degree (1 major) Computer Science (2017)					
	Master's degree (1 major) Computer Science (2018) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)					
		y course MINT Teacher Ed				
		ee (1 major) Aerospace Co			,	
	-	ee (1 major) Computer Sc	•			
Master's degree (1 major) Aerospace Computer Science (2021)						

Module title					Abbreviation		
Selected Topics in Internet Technologies				10-I=AKIT-161-m01			
Module	e coord	inator		Module offered by			
holder	of the (Chair of Computer Scie	nce 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					
Conten	Its						
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 networks, control mechanisms for redundant and real-time communication networks, p2p networks, ad-hoc networks, 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, mobilelP, 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 management [IETF traffic engineering, ITU-T TMN, OSI management), planning and management methods (IP management methods in telecommunication and evaluation of traffic and performance data, visualisation, result handling, simulation and analysis of networks), management tools, outlook and perspectives, 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. 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 semester, information on whether module is creditable for 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 j	olaces					
		ormation	Maatada				
	-	able for students of the	master's programme l	mormatik (Computer	Science, 120 ECIS (realts): 11.	
Workload							
	150 h						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
 Module appears in							
Master	's degr	ee (1 major) Computer hing degree Gymnasiur		ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	016)	
·		r Computer Science (2016)	JMU Würzbı	urg • generated 19-Apr-2025 • rd Master (120 ECTS) Informa	exam.	page 107 / 119	



Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018) 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)

Module title				Abbreviation		
Selected Topics in Intelligent Systems					10-I=AKIS-161-m01	
Module	coord	inator		Module offered by		
holder	of the C	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				
Content	ts					
Selecte	d topic	s in intelligent systems.				
Intende	ed learr	ning outcomes				
		possess an advanced kno plex problems in this are			. They are able to understand so- ns.	
Courses	5 (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V (2) + ĺ	Ü (2)					
		s essment (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
examin prox. 15	ation o ; minut ge of a:	f one candidate each (ap es per candidate). ssessment: German and/	prox. 20 minutes) or		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 lr	nformatik (Computer	Science, 120 ECTS credits): IS.	
Workloa	ad					
150 h						
Teachin	ng cycle	9				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module appears in						
Master's degree (1 major) Computer Science (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's degree (1 major) Computer Science (2018) 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)						

Module title				Abbreviation			
Selected Topics in Embedded Systems					10-I=AKES-161-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		Module level	Other prerequisites				
1 semes	ster	graduate					
Conten		3.444440					
		s in embedded systems.					
		ning outcomes					
The stu	dents p	-			They are able to understand so- ns.		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V (2) + l	Ü (2)						
		essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
lf annou examin prox. 15	unced l ation o ; minut ge of a	f one candidate each (ap es per candidate). ssessment: German and,	inning of the course, pprox. 20 minutes) or		tion may be replaced by an oral in groups of 2 candidates (ap-		
Allocati							
Additio	nalinf	ormation					
			lastor's programmo li	aformatik (Computer	Science, 120 ECTS credits): ES.		
Worklo			laster s programme n		Science, 120 Let's credits). L3.		
	au						
150 h							
Teachir	ig cycl	8					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			
	Module appears in						
Master's degree (1 major) Computer Science (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's degree (1 major) Computer Science (2018)							
	-			on PILIS Flite Netwo	ork Bavaria (ENB) (2020)		
	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)						
		ee (1 major) Aerospace Co					
	-	ee (1 major) Computer Sc		20)			
	-		omputer Science (202	21)			

Module title					Abbreviation			
Selected Topics in Aerospace Engineering					10-I=AKLR-161-m01			
Module coordinator				Module offered by				
holder of the Chair of Computer Science			nce VII	e VII Institute of Computer Science				
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)				
5	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts		- I					
stems, and doo tions, p cial are stems, ment, s	Selected topics in aerospace engineering, for example: satellite communication, rocket science, propulsion sy- stems, 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, spe- cial areas of navigation, space environment, environment simulation, verification and test of space faring sy- stems, space astronomy and planet missions, space medicine and biology, material science, quality manage- ment, space law, aeroflight topics, avionics for airplanes, air traffic control, areal navigation, pilot interfaces, air traffic control, air traffic management.							
Intende	ed lear	ning outcomes						
		possess an advanced k e foundations in their fu			selected area and a	re able to		
Course	S (type, r	umber of weekly contact hours	, language — if other than Ger	rman)				
V (2) +	Ü (2)							
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for 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). Separate written examination for Master's students. Language of assessment: German and/or English								
credita								
Allocation of places								
Additio	nal inf	ormation						
			Master's programme l	nformatik (Computer	Science, 120 FCTS (redits): I R		
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): LR. Workload								
150 h								
Teaching cycle								
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module appears in								
Master's degree (1 major) Computer Science (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's degree (1 major) Computer Science (2018) Master's with 1 major Computer Science (2016) Master's with 1 major Computer Science (2016)								
	.,-			rd Master (120 ECTS) Informa				

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)

Module	title	Abbreviation				
Selecte	d Topics in HCI		10-I=AKHCI-161-m01			
Module	coordinator		Module offered by			
holder of the Chair of Computer Science IX			Institute of Computer Science			
ECTS	Method of grading	Only after succ. con	npl. of module(s)			
5	numerical grade					
Duratio	n Module level	Other prerequisites	Other prerequisites			
1 semes	ster graduate		-			
Conten	ts					
Selecte	d topics in HCI.					
Intende	ed learning outcomes	-				
	dents understand the basic ap ns to complex problems in this					
Courses	S (type, number of weekly contact hours,	language — if other than Gei	rman)			
V (2) + l Course	Ü (2) type: alternatively S (2) or R (2)	instead of Ü (2)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
written examination (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						
Allocati	ion of places	-				
Additional information						
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI.						
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer Science (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)

Module title					Abbreviation	
Selected Topics in Computer Science 10-I=AKII-161-mo1						
Module coordinator				Module offered by		
Dean of Studies Informatik (Computer So			Science)	Institute of Comput	er Science	
ECTS	Method of grading Only after succ. compl. of module(s)					
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Selecte	d topic	s in computer science.				
Intende	ed leari	ning outcomes				
		are able to understand th d questions.	e solutions to compl	ex problems in comp	outer science and to transfer	
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V (2) + l	Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Computer Science (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)						

Module title					Abbreviation	
NLP and Text Mining 10-I=STM-162-m01						
Module coordinator				Module offered by		
holder of the Chair of Computer Science		ce VI	Institute of Comput	er Science		
ECTS Method 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		•			
tection, stic par The stu text min	, token rsing, w dents ning an	n the following areas: d isation, collocation, N-g yord sense disambiguat possess theoretical and id language processing ave gained experience	ram models, morpholo ion, term extraction m practical knowledge a mostly for English. The	ogy, hidden Markov ethods, information about typical method ay are able to solve p	models for tagging, p extraction, sentimer Is and algorithms in problems through the	probabili- nt analysis. the area of
Intende	ed lear	ning outcomes				
text mi	ning an	possess theoretical and Id language processing ve gained experience ir	They are able to solve	practical problems		
Course	S (type, r	umber of weekly contact hours	, language — if other than Ger	man)		
V (2) +	Ü (2)					
		sessment (type, scope, langu	age — if other than German, e	examination offered — if no	t every semester, informati	on on whether
module is creditable for 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 Allocation of places						
Additional information						
Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, IT, HCI.						
Workload						
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) 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 degree (1 major) Information Systems (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Master's wi	Naster's with 1 major Computer Science (2016) JMU Würzburg • generated 19-Apr-2025 • exam. page 115 / 119 reg. data record Master (120 ECTS) Informatik - 2016 page 115 / 119					page 115 / 119



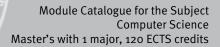
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Information Systems (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) 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)

Julius-Maxi

UNIVERSITÄT

WÜRZBURG





Thesis (30 ECTS credits)

Module title Abbreviation						
Concluding Colloquium Computer Science 10-I-MA-MK-162-mo1						
Module	e coord	linator	Module offered by	Nodule offered by		
Dean of Studies Informatik (Computer Science)			Science)	Institute of Compu	ter Science	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	• •	• •			
Presen	tation	and defence of the result	s of the Master's thes	sis in an open discu	ssion.	
Intend	ed lear	ning outcomes				
The stu	idents	are able to present the re	sults of their Master'	s theses and defend	I them in a discussion.	
Course	S (type, 1	number of weekly contact hours,	anguage — if other than Ge	rman)		
K (o)		-	-			
		s essment (type, scope, langu <i>a</i> ble for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether	
		um (approx. 60 minutes) assessment: German and	/or English			
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
	-	ee (1 major) Computer Sc ee (1 major) Computer Sc				

Module title					Abbreviation		
Master's Thesis Computer Science 10-I-MA-161-mo1							
Module coordinator				Module offered by			
Dean of Studies Informatik (Computer S			Science)	Institute of Comput	er Science		
ECTS	Metho	ethod of grading Only after succ. compl. of module(s)					
25	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts						
Indepe	ndent r	esearch and work on a to	pic of computer scie	nce that was agreed	upon with a lecturer.		
Intende	ed learı	ning outcomes					
	ls that				ice and use the knowledge and result of their work in an accepta-		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
No cour	rses as	signed to module					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
		s (50 to 100 pages) ssessment: German and/	or English				
Allocation of places							
Additio	nal inf	ormation					
Time to	Time to complete: 6 months						
Worklo	ad						
750 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Computer Science (2016) Master's degree (1 major) Computer Science (2017) Master's degree (1 major) Computer Science (2018) Master's degree (1 major) Computer Science (2021) Master's degree (1 major) Computer Science (2023) Master's degree (1 major) Computer Science (2025)							