

# Subdivided Module Catalogue for the Module studies (Bachelor)

# **Computer Science**

Examination regulations version: 2019 Responsible: Faculty of Mathematics and Computer Science Responsible: Institute of Computer Science

JMU Würzburg • generated 19-Apr-2025 • exam. reg. data record MB|079|-|-|H|2019

#### Abbreviations used

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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:

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

15-May-2019 (2019-36) 27-Jun-2019 (2019-41) 14-Nov-2019 (2019-52) 22-Jan-2020 (2020-13) 06-May-2020 (2020-39) 22-Jul-2020 (2020-57) 17-Dec-2020 (2020-110) 10-Mar-2021 (2021-17)

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09-Jun-2021 (2021-58) 22-Dec-2021 (2021-85) 05-Jul-2022 (2022-52) 31-Jan-2023 (2022-86) 15-Jun-2023 (2023-58) 13-Dec-2023 (2023-107) 07-Aug-2024 (2024-82) 22-Jan-2025 (2025-1)

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

## The subject is divided into

Abbreviation	Module title		Method of	nage
ADDIEVIALIOII	Module litte		grading	page
Summer Term 2019				
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13
10-I-SEC-191-m01	IT Security	5	NUM	18
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
10-I-PV-152-m01	Project Presentation	5	NUM	17
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
Winter Term 2019	•	•	•	
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13
10-I-SEC-191-m01	IT Security	5	NUM	18
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
10-I-PV-152-m01	Project Presentation	5	NUM	17
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
Summer Term 2020	·			
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-PV-152-m01	Project Presentation	5	NUM	17
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
10-I-SEC-191-m01	IT Security	5	NUM	18
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
Winter Term 2020	·			
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-I-HWP-152-m01	Practical course in hardware		B/NB	13
10-I-SEC-191-m01	IT Security	5	NUM	18
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10-I-LRLA-172-m01	Aerospace Laborat	Aerospace Laboratory		NUM	N	14
10-I-PLR-172-m01	Practical work Space	Practical work Space Technology		B/N	В	15
10-I-PP-191-m01	Practical Course in	Practical Course in Programming		B/N	В	16
10-I-PV-152-m01	Project Presentatio	n	5	NUM	N	17
10-I-SEM1-152-m01	Seminar - Selected	Topics in Computer Science 1	5	NUM	N	19
10-I-SEM2-152-m01	Seminar - Selected	Topics in Computer Science 2	5	NUM	N	20
10-I-SWP-152-m01	Practical course in	software	10	B/N	В	23
10-I-SKS-191-m01	Control Principles of	of Modern Communication Systems	8	NUM	N	21
Summer Term 2021						•
10-I-AGT-152-m01	Algorithmic Graph	Theory	5	NUM	N	9
10-l-Gl-152-m01	Selected Basics of	Computer Science	5	NUM	N	11
10-I-APR-172-m01	Advanced Program	ming	5	NUM	N	10
10-I-HWP-152-m01	Practical course in	hardware	10	B/N	В	13
10-I-SEC-191-m01	IT Security		5	NUM	N	18
10-I-LRLA-172-m01	Aerospace Laborat	ory	6	NUM	N	14
10-I-HMR-152-m01	Practical Measuren	nent and Control System Engineering	8	B/N	В	12
10-I-PLR-172-m01	Practical work Space	ce Technology	4	B/N	В	15
10-I-PP-191-m01	Practical Course in	Programming	10	B/N	В	16
10-I-PV-152-m01	Project Presentatio	n	5	NUM	N	17
10-I-SEM1-152-m01	Seminar - Selected	Topics in Computer Science 1	5	NUM	N	19
10-I-SEM2-152-m01	Seminar - Selected	Topics in Computer Science 2	5	NUM	N	20
10-I-SWP-152-m01	Practical course in	software	10	B/N	В	23
10-I-SKS-191-m01	Control Principles of	of Modern Communication Systems	8	NUM	N	21
Winter Term 2021			•	<u>.</u>		
10-I-AGT-152-m01	Algorithmic Graph	Theory	5	NUM	N	9
10-l-Gl-152-m01	Selected Basics of	Computer Science	5	NUM	N	11
10-I-APR-172-m01	Advanced Program	ming	5	NUM	N	10
10-I-HWP-152-m01	Practical course in	hardware	10	B/N	В	13
10-I-SEC-191-m01	IT Security		5	NUM	N	18
10-I-LRLA-172-m01	Aerospace Laborat	ory	6	NUM	N	14
10-I-HMR-152-m01	Practical Measuren	nent and Control System Engineering	8	B/N	В	12
10-I-PLR-172-m01	Practical work Space	ce Technology	4	B/N	В	15
10-I-PP-191-m01	Practical Course in	Programming	10	B/N	В	16
10-I-PV-152-m01	Project Presentatio	n	5	NUM	N	17
10-l-SEM1-152-m01	Seminar - Selected	Topics in Computer Science 1	5	NUM	N	19
10-I-SEM2-152-m01	Seminar - Selected	Topics in Computer Science 2	5	NUM	N	20
10-I-SWP-152-m01	Practical course in	software	10	B/N	В	23
10-I-SKS-191-m01	Control Principles of Modern Communication Systems		8	NUM	N	21
Summer Term 2022						-
10-I-AGT-152-m01	Algorithmic Graph Theory		5	NUM	N	9
10-l-Gl-152-m01	Selected Basics of Computer Science		5	NUM	N	11
10-I-APR-172-m01	Advanced Programming		5	NUM	N	10
10-I-HWP-152-m01	Practical course in hardware		10	B/N	В	13
10-I-SEC-191-m01	IT Security		5	NUM	N	18
10-I-LRLA-172-m01	Aerospace Laborat	ory	6	NUM	N	14
10-I-HMR-152-m01	Practical Measuren	nent and Control System Engineering	8	B/N	В	12
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10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15		
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16		
10-I-PV-152-m01	Project Presentation		NUM	17		
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19		
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20		
10-I-SWP-152-m01	Practical course in software	10	B/NB	23		
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21		
Winter Term 2022						
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9		
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11		
10-I-APR-172-m01	Advanced Programming	5	NUM	10		
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13		
10-I-SEC-191-m01	IT Security	5	NUM	18		
10-I-LRLA-172-m01	Aerospace Laboratory	6	NUM	14		
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	B/NB	12		
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15		
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16		
10-I-PV-152-m01	Project Presentation	5	NUM	17		
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19		
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20		
10-I-SWP-152-m01	Practical course in software	10	B/NB	23		
10-l-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21		
Summer Term 2023						
10-l-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9		
10-I-APR-172-m01	Advanced Programming	5	NUM	10		
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11		
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	B/NB	12		
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13		
10-I-LRLA-172-m01	Aerospace Laboratory	6	NUM	14		
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15		
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16		
10-I-PV-152-m01	Project Presentation	5	NUM	17		
10-I-SEC-191-m01	IT Security	5	NUM	18		
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19		
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20		
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21		
10-I-SWP-152-m01	Practical course in software	10	B/NB	23		
Winter Term 2023						
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9		
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM			
10-I-APR-172-m01	Advanced Programming	5	NUM			
10-I-HWP-152-m01	Practical course in hardware	10	o B/NB			
10-I-SEC-191-m01	IT Security	5	NUM			
10-I-LRLA-172-m01	Aerospace Laboratory	6	5 NUM			
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	8 B/NB			
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15		
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10-I-PP-191-m01	Practical Course in Programming		B/NB	16
10-I-PV-152-m01	Project Presentation		NUM	17
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21
Summer Term 2024				
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13
10-I-SEC-191-m01	IT Security	5	NUM	18
10-I-LRLA-172-m01	Aerospace Laboratory	6	NUM	14
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	B/NB	12
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
10-I-PV-152-m01	Project Presentation	5	NUM	17
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
10-I-SKS-191-m01	Control Principles of Modern Communication Systems	8	NUM	21
Winter Term 2024				
10-l-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-I-HWP-152-m01	Practical course in hardware	10	B/NB	13
10-I-SEC-191-m01	IT Security	5	NUM	18
10-I-LRLA-172-m01	Aerospace Laboratory	6	NUM	14
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	B/NB	12
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
10-I-PV-152-m01	Project Presentation	5	NUM	17
10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SWP-152-m01	Practical course in software	10	B/NB	23
10-I-SKS-242-m01	Control Principles of Modern Communication Systems	5	NUM	22
Summer Term 2025				
10-I-AGT-152-m01	Algorithmic Graph Theory	5	NUM	9
10-l-Gl-152-m01	Selected Basics of Computer Science	5	NUM	11
10-I-APR-172-m01	Advanced Programming	5	NUM	10
10-l-HWP-152-m01	Practical course in hardware		B/NB	13
10-I-SEC-191-m01	IT Security		NUM	18
10-I-LRLA-172-m01	Aerospace Laboratory	6	NUM	14
10-I-HMR-152-m01	Practical Measurement and Control System Engineering	8	B/NB	12
10-I-PLR-172-m01	Practical work Space Technology	4	B/NB	15
10-I-PP-191-m01	Practical Course in Programming	10	B/NB	16
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10-I-SEM1-152-m01	Seminar - Selected Topics in Computer Science 1	5	NUM	19
10-I-SEM2-152-m01	Seminar - Selected Topics in Computer Science 2	5	NUM	20
10-I-SKS-242-m01	Control Principles of Modern Communication Systems	5	NUM	22

Module title				Abbreviation		
Algorithmic Graph Theory				10-I-AGT-152-m01		
Module	coordinator		Module offered by			
holder	of the Chair of Computer Scienc	e l	Institute of Comput	er Science		
ECTS	Method of grading	Only after succ. com	pl. of module(s)			
5	numerical grade					
Duratio	n Module level	Other prerequisites				
1 semes	ster undergraduate					
Content	ts					
We disc colourir of graph progran	cuss typical graph problems: We ngs, work with planar graphs an h problems, we also become fai ns or how we show that they are	e solve round trip pro d find out how the ra niliar with new conce e fixed parameter con	blems, calculate ma nking algorithm of G pts, for example hov putable.	ximal flows, find matchings and oogle works. Using the examples w we model problems as linear		
Intende	ed learning outcomes					
The stur cipants course,	dents are able to model typical are able to decide which tool fr students learn in detail how to	problems in compute om the course helps estimate the run time	er science as graph p solve a given graph e of given graph algo	problems. In addition, the parti- problem algorithmically. In this rrithms.		
Courses	<b>s</b> (type, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (2) + ĺ	(2) ت					
Method ster, inf	<b>l of assessment</b> (type, scope, la formation on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-		
written If annou examin prox. 15 Langua credital	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					
Allocati	ion of places					
Additio	nal information					
Workload						
150 h						
Teaching cycle						
Referre	<b>Peferred to in LPO L</b> (avamination regulations for teaching degree programmes)					
S an II N						
§ 22 II Nr. 3 D)						

Module	title				Abbreviation
Advanc	ed Pro	gramming			10-I-APR-172-m01
Module	coord	inator		Module offered by	<u> </u>
holder	of the C	hair 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 semes	ster	undergraduate			
Conten	ts				
grams. and coo de a sei cussed.	e know If more de dupl nsible : d learr	ledge of basic programm complex problems are to icates occur. In this lectu structure. Also, further to <b>ing outcomes</b>	bing, taught in introdu b be tackled, subopti ire, further knowledg pics in the areas of s	actory lectures, it is p mal results like long e is to be conveyed o oftware security and	possible to realize simpler pro- r, incomprehensible functions on how to give programs and co- l parallel programming are dis-
Student then im allel pro sing.	ts learr pleme ocessir	n advanced programming nted in multiple language ng concepts are introduce	paradigms especiall es and their efficience ed culminating in the	y suited for space ap y measured using sta use of GPU architect	oplications. Different patterns are andard metrics. In addition, par- tures for extremely quick proces-
Courses	<b>s</b> (type,	number of weekly conta	ct hours, language —	if other than Germa	n)
V (2) + l	Ü (2)				
Method ster, inf	<b>l of ass</b> ormati	<b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English					
Allocati	ion of p	olaces			
Additional information					
Workload					
150 h					
Teaching cycle					
Referre	d to in	LPO I (examination regu	lations for teaching-o	legree programmes)	
§ 22    N	Vr. 3 b)				

Module title			Abbreviation			
Selected Basics of Computer Science				10-l-Gl-152-m01		
Module	coord	inator		Module offered by		
Dean of	f Studie	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Selecte	d topic	s in computer science.				
Intende	ed learı	ning outcomes				
The stu them to	dents a relate	are able to understand so d topics.	olutions to fundamen	tal problems in com	puter science and to transfer	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)	
V (4) +	Ü (2)					
Methoo ster, inf	<b>l of ass</b> formati	<b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If annou examin prox. 15 Langua credital	examin unced ation o gminut ge of a ble for	nation (approx. 60 to 120 by the lecturer at the beg of one candidate each (ap res per candidate). ssessment: German and, bonus	minutes). inning of the course, oprox. 20 minutes) or /or English	the written examina an oral examination	tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						

Module title Abl				Abbreviation		
Practic	Practical Measurement and Control System Engineering 10-I-HMR-152-m01					
Module	e coord	inator		Module offered by		
holder	of the (	Chair of Computer Scienc	e VI	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Practica linear c	al expe ontroll	riments of control aspect ers in robotics or aerospa	s (hardware and soft ace information techr	ware), for example in nology.	mplementation of linear and non-	
Intende	ed leari	ning outcomes				
Studen	ts unde	erstand closed loop syste	ems and are able to in	nplement and set co	ontrollers.	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)	
P (6)						
Methoo ster, in	<b>l of ass</b> formati	<b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
project	with p	resentation (approx. 15 m	ninutes) and written e	elaboration (approx.	12 to 15 pages)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
240 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						

Module	e title				Abbreviation
Practical course in hardware				10-I-HWP-152-m01	
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Informatik (Computer :	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Practica a comp	al expe dete mi	riments on hardware asp croprocessor.	ects, for example in o	communication tech	nology, robots or the structure of
Intende	ed leari	ning outcomes			
The stu scriptic results.	dents a ons, to i	are able to independently independently	y review, prepare and additional information	perform experiment on as well as to docu	ts with the help of experiment de- ument and evaluate experiment
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
P (6)					
Methoo ster, in	<b>d of ass</b> formati	s <b>essment</b> (type, scope, la on on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
portfoli (approx	o: com k. 10 mi	pletion of approx. 3 to 10 inutes per project)	project assignments	approx. 250 hours	total) and presentation of results
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
300 h					
Teaching cycle					
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
§ 22	§ 22    Nr. 3 b)				
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Module title				Abbreviation	
Aerosp	ace Lal	ooratory			10-I-LRLA-172-m01
Module	e coord	inator		Module offered by	
holder	of the (	Chair of Computer Science	e VIII	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Structu stems, ground of air a mechai	re and sensor segme nd spa nics. Se	control of satellites and a s and actuators, energy, ent for different componence ce flight. Life cycle of a co election of suitable comp	airplanes, control and structure (construction nts and systems of ai complex development onents.	d (very little) regulati on) of a satellite mod ir and space flight, si consisting of softwa	on of physical/mechanical sy- lel/simulator, construction of a tructure of simplified subsystems re, hardware, electronics and
Intende	ed lear	ning outcomes			
electron a devel mentat del.	nics an lopmen ion (so	d mechanics by themselv t will be tested: capture of ftware, hardware, mecha	ves as well as to oper of requirements, rudi nics), test design, ins	rate, test and docum mentary design, deta spection, maintenan	ent these. The whole life cycle of ailed design, modelling, imple- ce, transfer to the successor mo-
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
V (2) +	P (2)				
Methoo ster, in	<b>d of ass</b> formati	<b>sessment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-
Comple	etion of	approx. 6 practical exerc	cises (approx. 4 hours	s each)	
Allocat	ion of p	olaces			
	_				
Additional information					
Workload					
180 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					

Module	Module title Abbreviation					
Practic	Practical work Space Technology 10-I-PLR-172-m01					
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
4	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Comple	etion of	a practical task.				
Intende	ed learı	ning outcomes				
The pra	ctical a	allows participants to wo	rk on a problem in sp	ace information tech	nology in teams.	
Course	<b>s</b> (type	, number of weekly conta	ict hours, language –	- if other than Germa	ın)	
P (2)						
Methoo ster, in	<b>l of ass</b> formati	s <b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
report (	5 to 10	pages) and presentatior	ı (approx. 15 minutes)	) on practical work		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
120 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						

Module	Nodule title Abbreviation					
Practic	al Cour	se in Programming			10-I-PP-191-m01	
Module	coord	inator		Module offered by		
Dean o	f Studio	es Informatik (Computer )	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
		undergraduate	Intended learning o	utcomes of the follow	wing module are required: 10-I-	
			GdP. It is therefore s	strongly recommend	ed to complete this before.	
Conten	ts					
The pro	gramm	ning language Java. Indep	endent creation of s	nall to middle-sized	, high-quality Java programs.	
Intende	ed lear	ning outcomes				
The stu	dents a	are able to independently	/ develop small to mi	ddle-sized, high-qua	ality Java programs.	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
P (6)						
Methoo ster, in	<b>l of ass</b> formati	s <b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
practica minute If anno examin prox. 1 <u>9</u>	al exam s) unced ation c 5 minut	nination (programming ex by the lecturer at the beg of one candidate each (ap ces per candidate).	vercises, approx. 240 inning of the course, pprox. 20 minutes) or	hours) and written e the written examina an oral examination	examination (approx. 60 to 120 tion may be replaced by an oral in groups of 2 candidates (ap-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
300 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 49   N § 69   N	§ 49   Nr. 1 c) § 69   Nr. 1 d)					

Module	Module title Abbreviation						
Project	Preser	ntation			10-I-PV-152-m01		
Module	coord	inator		Module offered by			
Dean of	f Studie	es Informatik (Computer :	Science)	Institute of Comput	er Science		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
Present sentatio work-in	tation o on for l -progre	of a project developed by aypersons with a knowle ess, is presented with the	the student (e.g. Ba dge of computer scie help of a poster, a s	chelor's thesis, softw nce at a trade fair. Th hort talk and optiona	ware project) analogous to a pre- he project, which may also be ally a live demonstration.		
Intende	ed learı	ning outcomes					
The stu	dents a	are able to present a proj	ect they developed a	nd to create the requ	uired media.		
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	if other than Germa	n)		
S (5)							
Methoo ster, inf	<b>l of ass</b> formati	s <b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-		
present ge of co Langua	tation o ompute ge of a	of a project developed by r science at a trade fair a ssessment: German and,	the candidate analog s well as discussion /or English	gous to a presentatio (approx. 10 to 15 mir	on for laypersons with a knowled- nutes total)		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Workload							
150 h							
Teaching cycle							
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)							
§ 22	§ 22    Nr. 3 b)						

Module title					Abbreviation	
IT Secu	r <b>ity</b>				10-I-SEC-191-m01	
Module coordinator				Module offered by		
holder o	of the C	Chair of Computer Science	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 semes	ster	undergraduate				
Content	s					
Ine cou The cou (h de No So re Pl	<ul> <li>The course provides a broad sweep through concepts and technologies related to IT security:</li> <li>Theoretical aspects: information-theoretic security, computational security, introduction to cryptography (historical and modern ciphers, hash functions, pseudo-random generators, message authentication codes, public key cryptography)</li> <li>Network security: protocol security, security of TCP/IP, public key infrastructure, user authentication</li> <li>Software security: Software vulnerabilities, common programming errors and exploitation techniques, reverse engineering and obfuscation, malware and anti-malware</li> <li>Platform security: access control models, security policies, operating system security, virtualization, se-</li> </ul>					
Intende	d learr	ning outcomes				
Student and ana going to exercise	s will h alyze se o under es prov	be introduced to the mair ecurity of a system critica rstand the purpose and fu- ride some hands-on expe	n concepts and abstra lly from the attacker unction of several sec rience of security flow ct hours, language —	actions of IT security view point. After visi curity technologies, a vs in software. if other than Germa	r. They learn how to model threats iting the lecture students are as well as their limitations. The n)	
V(2) + i	i (2)	, number of weekly conta	et nours, tanguage			
Module	taught	t in: German and/or Engli	sh			
<b>Method</b> ster, inf	l <b>of ass</b> ormati	e <b>ssment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written If annou examina prox. 15 Languag creditat	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	on of p	olaces				
Additional information						
Workload						
150 h						
Teachin	Teaching cycle					
Referre	d to in	LPOI (examination regu	lations for teaching-d	legree programmes)		

Module	Module title Abbreviation					
Semina	ır - Sel	ected Topics in Computer	Science 1		10-I-SEM1-152-m01	
Module	coord	inator		Module offered by		
Dean of	f Studio	es Informatik (Computer S	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Indepe ware wi rent are	ndent r ith writ eas (thi	eview of a current topic i ten and oral presentatior s usually means that the	n computer science c n. The topics in modu y are assigned by diff	on the basis of literat les 10-I-SEM1 and 1c Ferent lecturers).	ture and, where applicable, soft- o-I-SEM2 must come from diffe-	
Intende	ed lear	ning outcomes				
The stu aspects	dents a s in wri	are able to independently tten form and to orally pr	/ review a current top esent these in an app	ic in computer scien propriate way.	ce, to summarise the main	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	· if other than Germa	in)	
S (2)						
Methoo ster, inf	<b>l of ass</b> formati	s <b>essment</b> (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
written cussior Langua	elabor 1 on a t ge of a	ation (approx. 10 to 15 pa opic from the field of con ssessment: German and,	ages) and presentatic nputer science /or English	on (approx. 30 to 45 i	minutes) with subsequent dis-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
§ 22 II Nr. 3 b)						

Module	Module title Abbreviation					
Semina	ar - Sele	ected Topics in Computer	Science 2		10-I-SEM2-152-m01	
Module	coord	inator		Module offered by		
Dean of	f Studie	es Informatik (Computer :	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Indepe ware wi rent are	ndent r ith writ eas (thi	eview of a current topic i ten and oral presentatior s usually means that the	n computer science c n. The topics in modu y are assigned by diff	on the basis of literat les 10-I-SEM1 and 10 Ferent lecturers).	ture and, where applicable, soft- o-I-SEM2 must come from diffe-	
Intende	ed learı	ning outcomes				
The stu aspects	dents a s in wri	are able to independently tten form and to orally pr	/ review a current top esent these in an app	ic in computer scien propriate way.	ce, to summarise the main	
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	if other than Germa	n)	
S (2)						
Methoo ster, inf	<b>d of ass</b> formati	sessment (type, scope, la on on whether module ca	nguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
Wrap-u Langua	p repoi ge of a	rt on tutoring activities (5 ssessment: German and,	to 10 pages) /or English			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	Workload					
150 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
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Module title					Abbreviation	
Control	Princi	ples of Modern Communi	cation Systems		10-I-SKS-191-m01	
Module coordinator				Module offered by		
holder of the Chair of Computer Science III			e III	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 seme	ster	undergraduate				
Conten	ts					
<ul> <li>C</li> <li>M</li> <li>B</li> <li>N</li> <li>H</li> <li>C</li> <li>S</li> <li>C</li> <li>Intended</li> <li>The studern commeasure</li> </ul>	<ul> <li>Control Mechanisms of Modern Communication Systems</li> <li>Multimedia Networking</li> <li>Broadband Access Networks</li> <li>Mobile Communication Systems</li> <li>Home Access Networks</li> <li>Current trends such as Internet of Things (IoT)</li> <li>Software Defined Networking (SDN)</li> <li>Control mechanisms implemented and deployed on the Internet</li> <li>Introduction of analytical performance evaluation</li> </ul> Intended learning outcomes The students possess advanced knowledge regarding the structure, architecture and control mechanisms of modern communication systems and are able to apply it to evaluate systems and protocols within simulations and					
analytic	cal perf	formance evaluation.	ct hours, language —	if other than Germa	n)	
V (/) +	Ü (2)					
Method	l of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-	
written If annot examin prox. 15 Langua credital	ster, information on whether module can be chosen to earn a bonus) written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
Allocat	ion of p	olaces				
Additional information						
Workload						
240 h						
Teachir	Teaching cycle					
Referre	d to in	LPO I (examination regu	lations for teaching-c	legree programmes)		

Module title					Abbreviation	
Control	Princi	ples of Modern Communi	cation Systems		10-I-SKS-242-m01	
Module coordinator				Module offered by		
holder of the Chair of Computer Science III			e III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
<ul> <li>C</li> <li>M</li> <li>B</li> <li>M</li> <li>H</li> <li>C</li> <li>S</li> <li>C</li> <li>Ir</li> <li>Intende</li> <li>The stu dern co measur</li> </ul>	<ul> <li>Control Mechanisms of Modern Communication Systems</li> <li>Multimedia Networking</li> <li>Broadband Access Networks</li> <li>Mobile Communication Systems</li> <li>Home Access Networks</li> <li>Current trends such as Internet of Things (IoT)</li> <li>Software Defined Networking (SDN)</li> <li>Control mechanisms implemented and deployed on the Internet</li> <li>Introduction of analytical performance evaluation</li> </ul> Intended learning outcomes The students possess advanced knowledge regarding the structure, architecture and control mechanisms of modern communication systems and are able to apply it to evaluate systems and protocols within simulations and					
analytic	cal perf	formance evaluation.	ct hours, language —	if other than Germa	n)	
V(2) +	Ü (2)					
Methoo	<b>l of ass</b> formati	essment (type, scope, la	nguage — if other tha	an German, examina a bonus)	tion offered — if not every seme-	
written If annou examin prox. 15 Langua credita	written examination (approx. 60 to 120 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap- prox. 15 minutes per candidate). Language of assessment: German and/or English creditable for bonus					
Allocat	ion of p	olaces				
Additional information						
Workload						
150 h						
Teachir	Teaching cycle					
Referre	d to in	LPO I (examination regu	lations for teaching-c	legree programmes)		

Module	Module title Abbreviation					
Practical course in software					10-I-SWP-152-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)		
10	(not) s	successfully completed	10-I-PP, 10-I-ST	<u>, , , , , , , , , , , , , , , , , , , </u>		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate	In addition, the know required. Prior atten ded.	wledge and skills ac dance of this modul	quired in module 10-I-ADS are e is therefore highly recommen-	
Conten	ts					
Comple cation tion an	etion of of solut d deliv	a project assignment in tion components (e. g. UI ery of the runnable softw	groups, problem ana ML) and milestones, ı are product in a collo	lysis, creation of req user manual, program quium.	uirements specifications, specifi- mming documentation, presenta-	
Intende	ed lear	ning outcomes				
The stu small to	idents j eams.	possess the practical skil	lls for the design, dev	velopment and execu	ition of a software project in	
Course	<b>s</b> (type	, number of weekly conta	ict hours, language —	- if other than Germa	n)	
P (6)						
Methoo ster, in	<b>d of ass</b> formati	sessment (type, scope, la ion on whether module ca	inguage — if other tha an be chosen to earn	an German, examina a bonus)	tion offered — if not every seme-	
practic sentati	al proje on (app	ect (Completion of a large prox. 10 minutes per grou	r software project in p)	groups (approx. 300	hours per person) and final pre-	
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Workload						
300 h						
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
§691N	§ 69   Nr. 1 d)					