

# Module Catalogue

for the Subject

# Space Science and Technology

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

Examination regulations version: 2009 Responsible: Institute of Computer Science



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# The subject is divided into

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# **Content and Objectives of the Programme**

No translation available.



#### **Abbreviations used**

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

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:

frei

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

21-Jul-2010 (2010-27) examination regulations without modules (sections/sub-sections only)

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.



# **Compulsory Courses**

# **Space Science**



Module title Abbreviation					Abbreviation	
Introdu	Introduction To Space Physics 10-I-SP-092-m01					
Module	coord	inator		Module offered by		
holder	of the	Chair of Computer Scie	nce VII	Institute of Compu	ter Science	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
7,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts		•			
4. Sun measui	and he	liosphere 5. Acceleration ergetic particles in spa	on and transport of ene		Elements of space plasma physics ne heliosphere 6. Instruments for	
		ning outcomes				
dynami	ics of c		heliosphere and in spa	ace. They are familia	articular, the description of the relevant parameters,	
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no info	rmation on SWS (weekl	y contact hours) and co	ourse language avai	lable)	
		<b>sessment</b> (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if n	ot every semester, information on whether	
		,				
Allocat	ion of	places				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
Module	appea	ars in				

Master's degree (1 major) Space Science and Technology (2009)

# **Space Technology**



Module	Module title Abbreviation					
The object-oriented Approach and Java Programming					10-I-00A-072-m01	
Module	coord	inator		Module offered by	<u>I</u>	
	•	ner university in Master's e and Technology	degree programme	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)		
3,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
le inclu to use	des de these.	tailed presentations of a			and training exercises. The modu- a as well as the respective ways	
	-	ning outcomes				
		are familiar with the basi lications.	cs of the programmin	g language Java and	are able to independently deve-	
Course	<b>S</b> (type, i	number of weekly contact hours, l	anguage — if other than Ge	rman)		
Ü + Ü (ı	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
	_	ee (1 major) Space Scienc		•		
Master's degree (1 major) Space Science and Technology (2009)						



Module title					Abbreviation	
CanSat Design Lab					10-I-CSD-072-m01	
Module coordinator				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	· · · · · ·		
4		successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	ıts					
ring, acknowled available and the	erospac edge an ole skill e groun	e technology, physics, m d skills in this as well as s in a single project. It co	nathematics. A satelli in numerous other fic vers the design and c are: telemetry and tel	te project is an inter elds. CanSat is thus development of the s ecommanding in wir	electronics, mechanical engineedisciplinary project that requires an ideal platform to combine all space segment control software reless communication: space segnstruction.	
Intend	ed learı	ning outcomes				
ged co proces mands	mmand sing an and to	s), telemetry (real time a	nd history data), attit tion. The ground segr play the telemetry.	tude control, power of ment ought to be ab	nanding (immediate and time-tag- control, payload control, image le to generate and send telecom-	
		ion on SWS (weekly cont			<u>a)</u>	
Metho	d of ass	•			ot every semester, information on whether	
	tion of p	nlaros				
	ion or p	naces				
Additio	onal inf	ormation				
Worklo	Workload					
Teachi	Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Modul	Module appears in					
	Master's degree (1 major) Space Science and Technology (2007) Master's degree (1 major) Space Science and Technology (2009)					



Module title					Abbreviation	
Interne	t Techi	nologies	10-I-IT-092-m01			
Module	coord	inator		Module offered by	<u> </u>	
holder	of the (	Chair of Computer Scienc	e III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	ıpl. of module(s)		
3,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts		,			
		basic mechanisms of TC obile networks, GSM tech		, IP network manage	ment, wireless access, e. g. 3rd	
Intende	ed lear	ning outcomes				
The stu	dents	master the fundamentals	of the structure, arch	nitecture and techno	logy of the internet.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua ble for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
Allocat	ion of p	olaces				
	,					
Additio	nal inf	ormation				
Workload						
Teaching cycle						
<del></del>						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Master	's degr	ee (1 major) Space Scien	ce and Technology (2	009)	_	



Module title					Abbreviation	
Advanc	ed Dat	abases	10-I-AD-092-m01			
Module	e coord	inator		Module offered by		
Dean o	f Studie	es Informatik (Computer	Science)	Institute of Comput	ter Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
3,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Data w	arehou	ses and data mining; XM	L databases; web da	tabases;introductio	n to Datalog.	
Intende	ed learı	ning outcomes				
The stu	dents l	nave an advanced knowl	edge about relationa	l databases, XML an	d data mining.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	lable)	
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
	- Creditab	le foi bolius)				
Allocat	ion of r	nlaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	Master's degree (1 major) Space Science and Technology (2009)					



Module title Abbreviation						
Space l	Space Dynamics 10-I-SD-092-m01					
Module	coord	inator		Module offered by		
holder	of the	Chair of Computer Scienc	e VII	Institute of Comput	ter Science	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		principles of astrodynam sations, spin-stabilised s			ors, actuators, control software,	
Intende	ed lear	ning outcomes				
		master the fundamentals sors and actuators as wel			cecraft and are familiar with the	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)	
Method	d of as	sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
module is	creditab	le for bonus)				
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
<u></u>						
Teaching cycle						
<del></del>						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module						
Master's degree (1 major) Space Science and Technology (2009)						



Module	Module title Abbreviation					
Spacecraft System Design					10-I-SSD-092-m01	
Module coordinator				Module offered by		
holder	of the (	Chair of Computer Scienc	e VII	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
7,50	nume	rical grade				
Duratio	on .	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	its					
on of the lemetry genera	nermal ,, telec tion: so	designs. Telecommunica ommando). Structure and	tion: ground contact I mechanisms. Energ	analysis, data transı y systems: primary,	gn and technologies, verificati- mission, satellite monitoring (te- secondary, management, power rechanical, electrical). Operation	
Intend	ed lear	ning outcomes				
		master system aspects of as and their integration in			g the example of spacecraft, ma-	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (ı	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua ole for bonus)	ge — if other than German, (	examination offered — if no	ot every semester, information on whether	
Allocat	ion of	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Space Science and Technology (2009)						



# **Space Science**



Module	Module title Abbreviation					
Introduction To Space Physics 10-I-SP-092-m01					10-I-SP-092-m01	
Module	coordi	inator		Module offered by		
holder	of the C	Chair of Computer Scienc	e VII	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
7,50	numei	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	-			
Conten	ts					
4. Sun	and hel		and transport of ene		lements of space plasma physics e heliosphere 6. Instruments for	
Intende	ed learr	ning outcomes				
dynami their th	ics of cl eoretic	harged particles in the he al formulation and the m	eliosphere and in spa ethods to measure th	ce. They are familianem.	articular, the description of the rwith the relevant parameters,	
		umber of weekly contact hours, l				
		mation on SWS (weekly o			•	
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
illoudle is	Cleuitab	le foi bolius)				
Allocat	ion of r	nlaces				
	<u> 6. þ</u>	, acco				
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Master	's degre	ee (1 major) Space Scienc	ce and Technology (2	009)		



# **Space Technology**



Module	Module title Abbreviation					
The obj	ject-or	ented Approach and Java	Programming		10-I-00A-072-m01	
Module	e coord	inator		Module offered by	<u> </u>	
	•	ner university in Master's e and Technology	degree programme	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)		
3,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
of view le inclu to use t	but in des de these.	a practice-oriented mann tailed presentations of a	ner with the help of n	umerous examples a	Java - not from a theoretical point and training exercises. The moduas well as the respective ways	
Intende	ed lear	ning outcomes				
		are familiar with the basion lications.	cs of the programmin	g language Java and	are able to independently deve-	
Course	<b>S</b> (type, i	number of weekly contact hours, l	anguage — if other than Ger	rman)		
1) Ü + Ü	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
		· · · · · · · · · · · · · · · · · · ·				
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
-						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
<del></del>						
Module appears in						
	Master's degree (1 major) Space Science and Technology (2007)					
Master	's degr	ee (1 major) Space Scienc	ce and Technology (2	009)		



Module title Abbreviation				Abbreviation	
CanSat Design Lab					10-I-CSD-072-m01
Modul	e coord	inator		Module offered by	I.
holder	of the (	Chair of Computer Scienc	e VIII	Institute of Comput	ter Science
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts				
ring, acknowled available and the	erospac edge an ole skill e groun	e technology, physics, m d skills in this as well as s in a single project. It co	athematics. A satelli in numerous other fi vers the design and o are: telemetry and tel	te project is an inter elds. CanSat is thus development of the ecommanding in wi	electronics, mechanical enginee- disciplinary project that requires an ideal platform to combine all space segment control software reless communication: space seg- onstruction.
		ning outcomes	, , , , , , , , , , , , , , , , , , , ,		
ged co proces	mmand sing an	ls), telemetry (real time a	nd history data), attit tion. The ground seg	tude control, power	nanding (immediate and time-tag- control, payload control, image le to generate and send telecom-
Course	<b>es</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
P (no i	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	e)
			${\sf ge-if}$ other than German, ${\sf or}$	examination offered — if no	ot every semester, information on whether
module i	s creditab	le for bonus)			
Alla aad		-1			
	tion of p	Jiaces			
 Additia	anal inf	ormation			
Additio	Jiiat IIII	omiation			
Workload					
	au				
Teachi	ng cycl	Δ			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
	Referred to III LF O I (examination regulations for teaching-degree programmes)				
Madul	e appea	ars in			

Master's degree (1 major) Space Science and Technology (2007) Master's degree (1 major) Space Science and Technology (2009)



Module title					Abbreviation	
Internet Technologies					10-I-IT-092-m01	
Module	e coord	inator		Module offered by		
holder	of the (	Chair of Computer Scienc	e III	Institute of Computer Science		
ECTS	Metho	od of grading	Only after succ. con	•		
3,50	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate						
Conten	ts		,			
	Structure and basic mechanisms of TCP/IP, internet routing, IP network management, wireless access, e. g. 3rd generation mobile networks, GSM technologies.					
Intende	ed lear	ning outcomes				
The stu	dents	master the fundamentals	of the structure, arch	nitecture and techno	logy of the internet.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
	<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
Allocat	Allocation of places					
Additional information						
Workload						
Teaching cycle						
<u></u>						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
<del></del>						
Module appears in						
Master	Master's degree (1 major) Space Science and Technology (2009)					



Module title					Abbreviation	
Advanced Databases					10-I-AD-092-m01	
Modul	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Computer :	Science)	Institute of Computer Science		
ECTS	Method of grading Only after succ. compl. of module(s)					
3,50	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	its					
Data w	arehou	ses and data mining; XM	L databases; web da	tabases;introductio	n to Datalog.	
Intend	ed learı	ning outcomes				
The stu	ıdents l	have an advanced knowl	edge about relational	l databases, XML an	d data mining.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (	no infor	rmation on SWS (weekly o	contact hours) and co	ourse language avail	lable)	
			${\sf ge-if}$ other than German, ${\sf or}$	examination offered — if no	ot every semester, information on whether	
module is creditable for bonus)						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	Master's degree (1 major) Space Science and Technology (2009)					



Module	Module title Abbreviation					
Space l	Space Dynamics 10-l-SD-092-m01					
Module coordinator				Module offered by		
holder	of the	Chair of Computer Scienc	e VII	Institute of Computer Science		
ECTS	· F			succ. compl. of module(s)		
4	numerical grade					
Duration Module level		Other prerequisites				
1 semester undergrad		undergraduate				
Conten	ts					
Fundamental principles of astrodynamics, orientation control of satellites, sensors, actuators, control software, example realisations, spin-stabilised satellites, 3-axis stabilised satellites.						
Intende	ed lear	ning outcomes				
The students master the fundamentals of dynamic aspects of the design of spacecraft and are familiar with the essential sensors and actuators as well as their areas of use in spaceflight.						
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)	
Method	d of as	sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
module is	creditab	le for bonus)				
Allocation of places						
Additio	nal inf	ormation				
Workload						
Teaching cycle						
<u></u>						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Space Science and Technology (2009)						



Module	Module title Abbreviation					
Spaced	craft Sy	stem Design			10-I-SSD-092-m01	
Modul	e coord	inator		Module offered by		
holder of the Chair of Computer Science			e VII	Institute of Computer Science		
ECTS	r r		Only after succ. com	Only after succ. compl. of module(s)		
7,50	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate						
Conter	nts					
orbits, disturbance forces, transfer orbits. Mission analysis: earth and sun-synchronous orbits, shadows, solar angle of incidence. Thermal control of satellites: thermal analysis, thermal design and technologies, verification of thermal designs. Telecommunication: ground contact analysis, data transmission, satellite monitoring (telemetry, telecommando). Structure and mechanisms. Energy systems: primary, secondary, management, power generation: solar cells. On-board data processing. Propulsion systems. Tests (mechanical, electrical). Operation of spacecraft. Ground segment.						
Intended learning outcomes						
The students master system aspects of the layouting of technical systems. Using the example of spacecraft, major subsystems and their integration into a working whole are being analysed.						
Courses (type, number of weekly contact hours, language — if other than German)						
V + Ü (	no info	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
	<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
Allocation of places						
		/IUCC3				
Additio	onal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	r's degr	ee (1 major) Space Sciend	ce and Technology (2	009)		

### **Focus**



# **Engineering Track**

## **Scientific Track**

# Nicht zugeordnet



# The Dynamics and Regulation of Systems and Structures



# **Space Robotics**



# **Space Robotics and Control**



# **Space Science and Instrumentation**



# **Space Automation and Regulation**



# An Introduction to Physical Space Research in Astrophysics, Space Science and Planetology



# Physical Space Advanced Studies in Astrophysics, Space Science and Instrumentation



# **Atmospheric and Space Physics**