

## Subdivided Module Catalogue for the Subject

# Physics

as vertieft studiertes Fach (studied with a focus on the scientific discipline) with the degree "Erste Staatsprüfung für das Lehramt an Gymnasien"

> Examination regulations version: 2009 Responsible: Faculty of Physics and Astronomy

## 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:

#### LASPO2009

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

#### 20-Feb-2013 (2012-75)

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

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## The subject is divided into

	Module title	ECTS credits	Method of grading	page
Scientific Discipline (92	ECTS credits)			
Compulsory Courses (	22 ECTS credits)			
11-P-DP1-092-m01	Demonstration Practical Course 1	6	NUM	8
11-P-DP2-092-m01	Demonstration Practical Course 2	5	NUM	9
	Experimental Physics 1 and 2 - Teaching Post (Mechanics,			
11-P-E-092-m01	Thermodynamics, Oscillations, Waves, Electrics, Magnetism and Optics)	22	NUM	10
11-P-FP-092-m01	Advanced Practical Course	4	B/NB	21
11-P-GK-092-m01	General Concepts	8	NUM	22
11-P-MP1-092-m01	Modern Physics 1	8	NUM	26
11-P-MP2-092-m01	Modern Physics 2	6	NUM	28
11-P-MP3-092-m01	Modern Physics 3	5	NUM	29
11-P-PA-112-m01	Lab Course A	5	B/NB	30
11-P-PB-L-092-m01	Lab Course B	6	B/NB	32
11-P-LLL-092-m01	Practice in Student Lab	2	NUM	25
11-P-TP1-092-m01	Theoretical Physics 1 (Teaching Post)	8	NUM	34
11-P-TP2-092-m01	Theoretical Physics 2	7	NUM	35
Teaching (10 ECTS credi	ts)	1 -		
11-P-FD1-092-m01	Teaching 1	4	NUM	16
11-P-FD2-092-m01	Teaching Concepts Consolidating Seminar	2	NUM	18
11-P-FD-LLL-092-m01	Student Lab Supervision (Physics)	4	B/NB	19
-	ell as subject-specific electives)			
Coophing deserves a standard				
ect-specific electives) (Sect To achieve the required nun Treier Bereich interdiscipli 1ex "Ergänzende Bestimmu	nust take modules worth a total of 15 ECTS credits in the area Freie ion 9 LASPO (general academic and examination regulations for t ober of ECTS credits, students may take any modules from the are nary: The interdisciplinary additional offer for a teaching degree of ngen für den "Freien Bereich" im Rahmen des Studiums für ein Le	eaching-de as below. can be four	egree programr	nes)).
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Module title					Abbreviation	
Radiat	ion Saf	ety and Protection			03-98-FSQ-STRA-092-m01	
Module coordinator				Module offered by	<u> </u>	
radiation protection commissioner of the University of Würzburg			he University of	Faculty of Medicine		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
2	(not)	successfully completed				
Duration Module level Other prerequisites						
1 seme	ester	undergraduate				
Conter	nts					
		uire radiation protection dinance, StrlSchV).	qualification in acco	rdance with the <i>Strai</i>	hlenschutzverordnung (Radiation	
Intend	ed lear	ning outcomes				
		formal expertise for han zverordnung (Radiation			nces in accordance with the	
Course	<b>es</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	in)	
V + S (I	no info	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
ster, in	Iformat	ion on whether module c	an be chosen to earn		tion offered — if not every seme-	
		ninations (30 to 60 minu				
Alloca	tion of	places				
		ormation				
	onal inf session		ation: Courses will us	ually be offered in th	e form of a block course with two	
Worklo	bad					
	1					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regu	llations for teaching-	degree programmes)		
Modul	e appea	ars in				
Module appears in Bachelor' degree (1 major) Biomedicine (2009)						
Bachel	Bachelor' degree (1 major) Biomedicine (2009) Bachelor' degree (1 major) Biomedicine (2013)					
	lor' deg	ree (1 major) Biomedicin	e (2013)			

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Modul	e title				Abbreviation
W- and	P-Cou	rses in Secondary Classe	es of Gymnasium (Ph	ysics)	11-FD-WP-092-m01
Module coordinator				Module offered by	· · · · · · · · · · · · · · · · · · ·
		Professorship of Experim cs and its Didactics	ental Physics at the	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
3	(not)	successfully completed			
Duratio	Iration Module level Other prerequisites				
1 seme	ster	undergraduate			
Conten	Its				
project	manag		upervision of semina		nasium, career counselling and ction to scientific working in a W-
Intend	ed lear	ning outcomes			
The stu	dents	are able to autonomously	y plan and conduct W	I and P seminars for	Oberstufe of Gymnasium.
		, number of weekly conta			
		mation on SWS (weekly			
a) writt c) sittir	en elat ng in or	on on whether module c poration (approx. 10 to 15 classes at a Gymnasium ssessment: German, Eng	pages) or b) present (approx. 3 hours)	•	entation (approx. 30 minutes) or
Allocat	ion of <sub>l</sub>	olaces			
studyir numbe ber of s	ng in 3r r of sul subject	d subject semester or hig bject semesters if studyir	gher, 2nd: has achiev ng in 1st or 2nd subje places will be alloca	ed a minimum of 50 ct semester). Among	ect semesters/ECTS credits (1st: ECTS credits, and 3rd: highest g applicants with the same num- list will be maintained and pla-
Additio	onal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
Modul	e appea	ars in			
First st	ate exa	mination for the teaching	g degree Gymnasium	Physics (2009)	

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Mouule	e title				Abbreviation				
Low Co	st - Hig	h Impact. Low-Budget E	xperiments for Scien	ce Courses (Phy-	11-MIND-Ph1-121-m01				
sics)									
Module coordinator				Module offered by					
holder	of the (	Chair of Physics and its D	Didactics	Faculty of Physics a	and Astronomy				
ECTS	1	od of grading	Only after succ. con	pl. of module(s)	, i i i i i i i i i i i i i i i i i i i				
2		successfully completed		•					
Duratio	on	Module level	Other prerequisites						
1 seme		undergraduate	1		studying at least one subject in				
			the natural sciences	·					
Conten	ts		J						
Concer	- otion ar	d realisation of experim	ental stations with or	dinary and inexpens	ive consumables for classes of				
		and secondary level I.	citat stations with or	analy and mexpens					
Intende	ed lear	ning outcomes							
		-	experimenting statio	ons to use for the tra	nsition from primary to seconda-				
					to simplify and convey scientific				
		ant to the curriculum in							
Course	s (type	, number of weekly conta	act hours, language –	- if other than Germa	ın)				
		tion on SWS (weekly con							
	-	· ·			tion offered — if not every seme-				
		on on whether module c			alon oncrea in not every serie				
-					time to complete: 1 to 4 weeks)				
					in groups (approx. 20 minutes,				
groups					5 1 1 1				
Allocat	ion of <b>j</b>	olaces							
				Allocation of places					
Additic	nal inf								
Auditio	/II.a.t. IIII	ormation							
		ormation							
		ormation							
 Worklo	ad	ormation							
 Worklo  Teachin									
 Teachii	ng cycl		ulations for teaching-o	legree programmes)					
 Teachii	ng cycl	e	ulations for teaching-o	degree programmes)					
 Teachii 	ng cycl ed to in	e LPOI (examination regu	ulations for teaching-o	degree programmes)					
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Modul					Abbreviation
Teachi	ng Scie	nce with Hands-on-Exhi	bits (Physics)		11-MIND-Ph2-121-m01
Module coordinator				Module offered by	
holder of the Chair of Physics and its Didactics			)idactics	Faculty of Physics	and Astronomy
ECTS	1	od of grading	Only after succ. con	· · · ·	
2		successfully completed			
 Duratio	<u> </u>	Module level			
			Other prerequisites		studying at least one subject in
1 semester undergraduate		the natural sciences	•	studying at least one subject in	
Conter	nts				
Design	ing and	l creating hands-on exhi	bits for STEM subject	S.	
Intend	ed lear	ning outcomes			
tents in	n and o		nd implement an inte		roach for teaching scientific con- e exhibition as an example of pro
Course	<b>es</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	an)
S (no i	nforma	tion on SWS (weekly con	tact hours) and cours	e language availabl	e)
		sessment (type, scope, la ion on whether module c			ation offered — if not every seme-
	kamina				time to complete: 1 to 4 weeks) n in groups (approx. 20 minutes,
Allocat	tion of	olaces			
Additio	onal inf	ormation			
Worklo	bad		-		
Toachi	ng cycl	0			
Teacin	ing cycl	e			
					<u>,                                     </u>
Referre	ed to in	LPOI (examination regu	liations for teaching-	aegree programmes	)
Modul	e appea	ars in			
		ars in mination for the teaching	g degree Grundschule	e Physics (2009)	
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First st First st First st First st First st First st First st	ate exa ate exa ate exa ate exa ate exa ate exa ate exa ate exa	mination for the teaching mination for the teaching	g degree Grundschule g degree Hauptschule g degree Hauptschule g degree Realschule F g degree Gymnasium g degree Sonderpäda	e Didactics in Physic e Physics (2009) e Didactics in Physic Physics (2009) Physics (2009) gogik Didactics in P	s (Secondary School) (2009)
First st First st First st First st First st First st First st First st	ate exa ate exa ate exa ate exa ate exa ate exa ate exa ate exa	mination for the teaching mination for the teaching	g degree Grundschule g degree Hauptschule g degree Hauptschule g degree Realschule F g degree Gymnasium g degree Sonderpäda g degree Sonderpäda	e Didactics in Physic e Physics (2009) e Didactics in Physic Physics (2009) Physics (2009) gogik Didactics in P gogik Didactics in P	s (Secondary School) (2009) hysics (Secondary School) (2009

LA Gymnasien Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 7 / 37
	reg. data record Lehramt Gymnasien Physik - 2009	

Module	e title				Abbreviation	
Demon	stratio	n Practical Course 1			11-P-DP1-092-m01	
Module coordinator				Module offered by		
			i da ati an	Faculty of Physics and Astronomy		
	nolder of the Chair of Physics and its Didactics				and Astronomy	
<b>ECTS</b> 6		od of grading rical grade	Only after succ. con	ipt. of module(s)		
·						
Duration         Module level         Other prerequisites						
1 semester undergraduate						
Conten	ts					
used in hand e	ı schoo xperim	l, goal setting and didact ents, model experiments	tic potential of demon , etc.; computer-aide	nstration experiment d experiments; mea	I, knowledge of tools typically ts, student experiments, free- sured value acquisition, interac- ucation, presentation competen-	
Intende	ed lear	ning outcomes				
matic a and the learnin	inalysis eir dida g goals	of error sources of own ctic potential; experience	experiments; identifie e in choosing, constru	cation of categories ucting and presentin	in commerce and school; syste- of experiments, their functions of experiments according to the ation and pupils experiments;	
Course	<b>s</b> (type	, number of weekly conta	ict hours, language –	- if other than Germa	in)	
P (no ir	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)	
		s <b>essment</b> (type, scope, la on on whether module ca			tion offered — if not every seme-	
oral exa 20 min		ion of one candidate eac	h (approx. 10 minute	s) or oral examinatio	n in groups (groups of 2, approx.	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Tooch		•				
Teachi	ig cycl	e				
		LPOI (examination regu				
§ 53 (1)	1. c) P	hysik Mechanik, Wärmel hysik physikalische Grun hysik "physikalische Pral	dpraktika	re, Optik, der speziel	llen Relativitätstheorie	
Module	e appea	ars in				
First sta	ate exa	mination for the teaching	g degree Grundschule	e Physics (2009)		
First sta	ate exa	mination for the teaching	g degree Hauptschule	Physics (2009)		
		mination for the teaching	-			
		mination for the teaching				
First sta	ate exa	mination for the teachinន្	g degree Mittelschule	Physics (2013)		

LA Gymnasien Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 8 / 37
	reg. data record Lehramt Gymnasien Physik - 2009	

Module	Module title Abbreviation				
Demon	stratio	n Practical Course 2			11-P-DP2-092-m01
Module	e coord	inator		Module offered by	
holder of the Chair of Physics and its Didactics			idactics	Faculty of Physics a	nd Astronomy
ECTS		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				
		experiments of physics e formation.	ducation, especially f	for secondary level II	I. Subject media, acquisition and
Intende	ed learı	ning outcomes			
dia in v they ha	iew of ve exp	didactic-methodological	aspects and know th systems for physical	e potentials and limi	periments and in using multime- its of different types of media; methods of contemporary infor-
Course	<b>s</b> (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
		e <b>ssment</b> (type, scope, la on on whether module ca			tion offered — if not every seme-
oral exa 20 min		ion of one candidate eacl	h (approx. 10 minutes	5) or oral examinatio	n in groups (groups of 2, approx.
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	e appea	ars in			
First sta	ate exa	mination for the teaching	g degree Gymnasium	Physics (2009)	

Experi	<u>le title</u>				Abbreviation	
	imental	Physics 1 and 2 - Teach	ing Post (Mechanics,	Thermodynamics,	11-P-E-092-m01	
		Naves, Electrics, Magne	etism and Optics)			
Modul	le coord	inator		Module offered by		
Managing Director of the Institute of A			Applied Physics	Faculty of Physics a	and Astronomy	
ECTS		od of grading	Only after succ. cor	npl. of module(s)		
22	nume	rical grade				
Durati	ion	Module level	Other prerequisites			
2 seme	ester	undergraduate	-		s) for first-semester s	
			sound reading, writ	ing and maths skills	as well as logical thi	nking skills.
Conter	nts					
Physic	al laws	and elementary mathen	natical calculation me	thods of mechanics,	thermodynamics, vi	bration, wa-
ves, so	cience c	f electricity, magnetism	, electromagnetic vibr	ation and waves, rac	liation and wave opt	ics.
Intend	led lear	ning outcomes				
The stu	udents	understand the basic pr	inciples, connections	and calculation met	hods of mechanics, t	hermodyna-
		ns, waves, science of el	ectricity, magnetism,	electromagnetic vibr	ations and waves, ra	diation and
wave c	optics.					
Course	<b>es</b> (type	, number of weekly cont	act hours, language –	– if other than Germa	an)	
Experi	imentell	e Physik 1 (Experimenta	l Physics 1): V (4 week	kly contact hours) + Ü	J (2 weekly contact h	ours), once a
		emester)				
		e Physik 2 (Experimenta	ll Physics 2): V (4 wee	kly contact hours) +	Ü (2 weekly contact h	nours), once
		er semester) 1e Rechenmethoden 1 (N	Asthomatical Mathad	s 1). V (a wookly cont	tact hours) , Ü (1 woo	kly contact
		year (winter semester)			lact hours) + 0 (1 wee	ekty contact
		ie Rechenmethoden 2 (I	Nathematical Method	s 2): V (2 weekly con	tact hours) + Ü (1 we	ekly contact
		year (summer semester)		- ,· ( ···· , ···		· · <b>,</b> · · · · · ·
		<b>sessment</b> (type, scope, l ion on whether module o			ition offered — if not	every seme-
<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Experimentelle Physik 1 (Experimental Physics 1)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (approx. 30 minutes, groups of 2 candidates).</li> <li>2. Topics covered in lectures and exercises in part 2 (Experimentelle Physik 2 (Experimental Physics 2)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (approx. 30 minutes, groups of 2 candidates).</li> <li>3. Topics covered in lectures and exercises in part 2 (Mathematische Rechenmethoden 1 (Mathematical Methods 1)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes)</li> <li>4. Topics covered in lectures and exercises in part 2 (Mathematische Rechenmethoden 2 (Mathematical Methods 2)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes)</li> <li>5. Topics covered in lectures and exercises in parts 1 and 2: oral examination (approx. 60 minutes)</li> <li>5. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination of one candidate each (approx. 30 minutes, usually chosen) or written examination of one candidate each (approx. 30 minutes)</li> <li>5. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination of one candidate each (approx. 30 minutes, usually chosen) or written examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes)</li> <li>5. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written e</li></ul>						
exar nute 2. Topi exar nute 3. Topi 1)): e 4. Topi 2)): 5. Topi minu Succes ponen To qua well as telle Pl sed in	minatio es) or or ics cove minatio es) or or ics cove exercise ics cove exercise ics cove utes, us ssful co alify for s assess Physik 1 these t	n (approx. 120 minutes, al examination in group red in lectures and exer n (approx. 120 minutes, al examination in group red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer sured in lectures and exer sure	cises in part 1 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen cises in part 1 and 2 examination (approx 6 of practice work eac nt component 5, stude d 4. Students are high ) and Experimentelle F th the topics discusse	al examination of on s, groups of 2 candid mentelle Physik 2 (E al examination of on s, groups of 2 candid matische Rechenme ) or written examinat matische Rechenme ) or written examinat oral examination of . 120 minutes). h is a prerequisite for ents must pass asses ally recommended to Physik 2 (Experiment d in Mathematische	e candidate each (ap ates). xperimental Physics e candidate each (ap ates). thoden 1 (Mathemat tion (approx. 60 minu thoden 2 (Mathemat tion (approx. 60 minu one candidate each or admission to asses ssment component 1 attend both courses al Physics 2). The top	oprox. 20 mi 2)): written prox. 20 mi ical Method utes) ical Method utes) (approx. 30 ssment com- and/or 2 as Experimen- pics discus-
exar nute 2. Topi exar nute 3. Topi 1)): e 4. Topi 2)): 5. Topi min Succes ponen To qua well as telle Pl sed in Metho Studer To pas	minatio es) or or ics cove minatio es) or or ics cove exercise ics cove exercise ics cove utes, us ssful co ts 1 thro alify for s assess Physik 1 these t ods) 1 ar nts mus ss this n	n (approx. 120 minutes, al examination in group red in lectures and exer n (approx. 120 minutes, al examination in group red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer sually chosen) or written mpletion of approx. 50% ough 4. admission to assessment sment components 3 an (Experimental Physics 1)	cises in part 1 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen cises in part 1 and 2: examination (approx 6 of practice work eac nt component 5, stude d 4. Students are high and Experimentelle F th the topics discusse assessment component t components 1 throu irst pass assessment	al examination of on s, groups of 2 candid mentelle Physik 2 (E al examination of on s, groups of 2 candid matische Rechenme ) or written examination matische Rechenme ) or written examination or written examination of . 120 minutes). h is a prerequisite for ents must pass asses ally recommended to Physik 2 (Experiment of in Mathematische nt 5. gh 5 online (details t	e candidate each (ap ates). xperimental Physics e candidate each (ap ates). thoden 1 (Mathemat tion (approx. 60 minu thoden 2 (Mathemat tion (approx. 60 minu one candidate each or admission to asses ssment component 1 attend both courses al Physics 2). The top Rechenmethoden (M	oprox. 20 mi 2)): written oprox. 20 mi ical Method utes) ical Method utes) (approx. 30 ssment com- and/or 2 as Experimen- bics discus- Nathematica
exar nute 2. Topi exar nute 3. Topi 1)): e 4. Topi 2)): 5 5. Topi minu Succes ponen To qua well as telle Pl sed in Metho Studer To pas 3 and 4	minatio es) or or ics cove minatio es) or or ics cove exercise ics cove exercise ics cove statist cove alify for s assess Physik 1 these t ods) 1 ar nts mus ss this n 4 and m	n (approx. 120 minutes, al examination in group red in lectures and exer n (approx. 120 minutes, al examination in group red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer es or talk (approx. 15 minutes) red in lectures and exer sually chosen) or written mpletion of approx. 50% ough 4. admission to assessment (Experimental Physics 1) wo courses, together with a t register for assessment nodule, students must fi	cises in part 1 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Experi usually chosen) or or s (approx. 30 minutes cises in part 2 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen cises in part 1 and 2: examination (approx 6 of practice work eac nt component 5, stude d 4. Students are high and Experimentelle F th the topics discusse assessment component t components 1 throu irst pass assessment component ent component 5.	al examination of on s, groups of 2 candid mentelle Physik 2 (E al examination of on s, groups of 2 candid matische Rechenme ) or written examination matische Rechenme ) or written examination or written examination of al examination of . 120 minutes). h is a prerequisite for ents must pass asses by recommended to Physik 2 (Experiment d in Mathematische nt 5. gh 5 online (details t component 1 or 2 as	e candidate each (ap ates). xperimental Physics e candidate each (ap ates). thoden 1 (Mathemat tion (approx. 60 minu thoden 2 (Mathemat tion (approx. 60 minu one candidate each or admission to asses ssment component 1 attend both courses al Physics 2). The top Rechenmethoden (M to be announced). well as assessment of	oprox. 20 mi 2)): written oprox. 20 mi ical Method utes) (approx. 30 ssment com- and/or 2 as Experimen- bics discus- Nathematica

#### Allocation of places

#### Additional information

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#### Workload

--

#### Teaching cycle

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

§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik"

#### Module appears in

First state examination for the teaching degree Grundschule Physics (2009)

First state examination for the teaching degree Hauptschule Physics (2009)

First state examination for the teaching degree Realschule Physics (2009)

First state examination for the teaching degree Gymnasium Physics (2009) First state examination for the teaching degree Mittelschule Physics (2013)

No final examination Special study offering (2010)

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	reg. data record Lehramt Gymnasien Physik - 2009	ĺ

Module					Abbreviation	
Teachir	ng Sem	inar Fundamental Princi	ples		11-P-EL-092-m01	
Module	o coord	inator		Module offered by		
holder of the Chair of Physics and its D			· · · · · · · · · · · · · · · · · · ·		and Astronomy	
ECTS		od of grading		Only after succ. compl. of module(s)		
4 (not) successfully completed						
Duratio	<u> </u>	Module level	Other prerequisites			
1 seme		undergraduate			ommended. Certain prerequisites	
			must be met to qualify for admission to assessment. The lecturer will in-			
					ils at the beginning of the cour-	
			-		nsidered a declaration of will to	
					nts have obtained the qualificati-	
					e course of the semester, the lec-	
				-	sment into effect. Students who	
					o assessment in the current or in	
					ent at a later date, students will	
			have to obtain the q	ualification for admi	ission to assessment anew.	
Conten	ts					
sed on	specifi		ucation, verbalisatior		ruction of physical contents ba- s, possible teaching methods, ty-	
Intende	ed learr	ning outcomes				
student	t preco		edia on relevant topi	cs; awareness of the	e of common methods, typical differences between teaching	
Course	<b>s</b> (type,	, number of weekly conta	ict hours, language –	- if other than Germa	ın)	
S (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
		s <b>essment</b> (type, scope, la on on whether module ca			tion offered — if not every seme-	
prox. 4	5 minut		ation (approx. 45 min	utes) or d) oral exam	on/seminar presentation (ap- ination of one candidate each iinutes)	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
 Referre	d to in	LPO I (examination regu	lations for teaching-	legree programmes)		
§ 53 (1)	2. Phy	sik Fachdidaktik				
Module	· · ·					
First sta	ate exa	mination for the teaching mination for the teaching				
A Gymnasi				rg • generated 26-Aug-2024	• exam. page 12 / 37	

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	1 0 1 31
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First state examination for the teaching degree Realschule Physics (2009) First state examination for the teaching degree Gymnasium Physics (2009) First state examination for the teaching degree Mittelschule Physics (2013)

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	reg. data record Lehramt Gymnasien Physik - 2009	1

Modul	e title				Abbreviation	
Studer	nt Lab S	upervision (Physics)			11-P-FB-LLL-121-mo	1
Modul	o coord	inator		Module offered by		
Module coordinator		<b>D</b> : 1 ::				
		Chair of Physics and its		Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. cor	npl. of module(s)		
2		successfully completed				
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				e subject in
			the natural science	s.		
Conter	nts					
		ovides an introduction g-learning-laboratory.	to successful supervis	sion of pupils indepe	ndently carrying out	experiments
		ning outcomes				
		earn to classify differe				• • • • •
experin ly and ve beh terns b	menting criticall aviour p by repea	ance, to support the pu (supervision compete y evaluate their own ac patterns and to suppor tedly working on the sa tencies).	ncies in open classroo tions. A lecturer gives the students' strengtl	m situations). The st individual feedback hs. The students dev	udents are able to m to the students to av elop professional be	ethodical- oid negati- haviour pat-
Course	es (type	number of weekly con	tact hours, language -	– if other than Germa	n)	
		ion on SWS (weekly co				
		essment (type, scope,				everv seme-
		on on whether module				every serife
	xaminat	nination (approx. 45 m ion of one candidate e				
Alloca	tion of p	olaces				
Additio	onal info	ormation				
Worklo	oad					
Teachi	ing cycl	9				
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)		
Modul	e appea	rs in				
			ng degree Grundschub	e Physics (2000)		
	First state examination for the teaching degree Grundschule Physics (2009) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2009)					
First state examination for the teaching degree Hauptschule Physics (2009)						
	First state examination for the teaching degree Hauptschule Didactics in Physics (Secondary School) (2009)					
	First state examination for the teaching degree Realschule Physics (2009)					
		mination for the teachi		• •		
				•	nysics (Secondary So	:hool) (2009)
First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Secondary School) (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2013)						
		mination for the teachi				
	tate exa	initiation for the teach	ng degree Mittelschule	e Physics (2013)		
First st	sien Physic			e Physics (2013)	• exam.	page 14 / 37



First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2013)

LA Gymnasien Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 15 / 37
	reg. data record Lehramt Gymnasien Physik - 2009	

Module title Abbreviation						
Teachi					11-P-FD1-092-m01	
Module		-		Module offered by		
	· · · · ·	Chair of Physics and its		Faculty of Physics a	nd Astronomy	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
4	L	rical grade				
Duratio		Module level	Other prerequisites			
	1 semester     undergraduate     Prior completion of module 11-P-E recommended.					
Conten	ts					
technic gitimat elemer	Student preconceptions and typical learning difficulties in school physics, corresponding teaching methods and techniques to change student preconceptions; epistemological and working methods of physics. Justification/le-gitimation of physics education, educational goals of physics, qualification models and educational standards: elementarisation and didactic reconstruction of physical contents, methods of physics education, media in physics education and their application to support learning.					stification/le- l standards:
Intende	ed learr	ning outcomes				
learnin proach and go	g diffic es for s als of tł	ulties; knowledge of ho elected topics; knowle	evant areas of Physics ow to change student p dge of epistemological ics; knowledge of elem	reconceptions; know I methods of Physics	vledge of alternative ; knowledge of the lo	teaching ap- egitimation
Course	<b>s</b> (type,	, number of weekly cor	tact hours, language –	- if other than Germa	n)	
ster) Einführ	rung Fac		on to Didactics 1): S (2			
			language — if other the can be chosen to earn		tion offered — if not	every seme-
<ol> <li>Sem on (a grou</li> <li>Topic amin exan</li> </ol>	inar (Ein approx. ps (app cs cove nation (a ninatior	30 minutes) or oral ex- rox. 20 minutes, group red in lectures and exe approx. 45 minutes) or	1/Introduction to Dida amination of one candi	date each (approx. 1 ndidaktik 2/Introduc pages) or presentatio	o minutes) or oral ex tion to Didactics 2): on (approx. 30 minu	kamination in written ex- tes) or oral
		-	nt components 1 and 2 pass both assessment			nt 2.
Allocat	ion of p	laces				
Additio	onal info	ormation				
Important information on number and allocation of places: There is a restricted number of places. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will be allocated according to the number of subject semesters/ECTS credits (1st: studying in 3rd subject semester or higher, 2nd: has achieved a minimum of 50 ECTS credits, and 3rd: highest number of subject semesters if studying in 1st or 2nd subject semester). Among applicants with the same number of subject semesters/ECTS credits, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.						
Worklo						
LA Gymnas	ien Physic	s (2009)		ırg ● generated 26-Aug-2024 o ord Lehramt Gymnasien Physi		page 16 / 37

#### Teaching cycle

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

§ 36 (1) 7. Didaktik der Grundschule Physik

§ 38 (1) 1. Didaktik der Hauptschule Physik

§ 38 (1) 1. Didaktik der Mittelschule Physik

§ 53 (1) 2. Physik Fachdidaktik

§ 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik"

§ 77 (1) 2. Physik Fachdidaktik

#### Module appears in

First state examination for the teaching degree Grundschule Physics (2009)

First state examination for the teaching degree Hauptschule Physics (2009)

First state examination for the teaching degree Realschule Physics (2009)

First state examination for the teaching degree Gymnasium Physics (2009)

First state examination for the teaching degree Mittelschule Physics (2013)

LA Gymnasien Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 17 / 37
	reg. data record Lehramt Gymnasien Physik - 2009	

Teaching Concepts Consolidating Seminar       Int-P.FD2-092-m01         Module coordinator       Module offered by         holder of the Chair of Physics and its Didactics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         2       numerical grade          Duration       Module level       Other prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If sucdents who meet all prerequisites will be admitted the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment in the current or in the subsequent semester. For assessment inter application for learning support, especially regarding computers, epistemological and working methods, new teaching methods.         Different topics of current subject-didactic research; examples: Interest and physics education, effect of subject media and their application for learning support, especially regarding computers, epistemological and working methods, new teaching methods.         Intended learning outcomes       Knowledge of edidactic physical iterature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.         Courses (type, number of weekly contact hours, language – if other than German) <td< th=""><th colspan="5">Module title Abbreviation</th></td<>	Module title Abbreviation					
holder of the Chair of Physics and its Didactics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         2       inumerical grade          1 semester       Undergraduate       Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be admitted the beginning of the course. Registration for the course will be admitted the qualification for admission to assessment or the course of the semester, the lecturer will put their registration for assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to rearring support, especially regarding computers, epistemological and working methods, new teaching methods.         Intended learning outcomes       Knowledge of selected methods of didactic physical research, evaluation of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.         Courses (type, number of weekly contact hours) and course language available)         Method of assessment (type, scope, language – if other than German)         S (no information on whether module can be chosen to earn a bonus)         a) written examination (approx. 49 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation (approx. 49 minutes) or b) term paper (approx. 8 pages, time to	Teaching Co	ncepts Consolidating	Seminar		11-P-FD2-092-m01	
ECTS       Method of grading       Only after succ. compl. of module(s)         2       numerical grade	Module coor	dinator		Module offered by		
2       numerical grade          Duration       Module level       Other prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.         Contents         Different topics of current subject-didactic research; examples: Interest and physics education, effects of subject media and their application for learning support, especially regarding computers, epistemological and working methods, new teaching methods.         Intended learning outcomes       Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of selected methods of ubity to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.         Courses (type, number of weekly contact hours, language — if other than German)       S (no information on Wether module can be chosen to earn a bonus)         a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 20 minutes) or of al examination of one candidate eac	holder of the	Chair of Physics and i	ts Didactics	actics Faculty of Physics and Astronomy		
Duration         Module level         Other prerequisites           1 semester         undergraduate         Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment or the course of the semester, the lecturer will put their registration for assessment or the course of the semester, the lecturer will put their registration for assessment in the current or in the subsequent semester. For assessment to assessment at a later date, students will have to obtain the qualification, effects of subject           Different topics of current subject-didactic research; examples: Interest and physics education, effects of subject media and their application for learning support, especially regarding computers, epistemological and working methods, new teaching methods.           Intended learning outcomes         Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.           Courses (type, number of weekly contact hours, language — if other than German)           S (no information on SWS (weekly contact hours, language — if other than German)           s () or oral examination in groups (approx. 20 minutes) or or al examination of one candidate each (approx. 30 minutes) or oral examination of one candidate each (approx. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2)           Alditional information	ECTS Met	hod of grading	Only after succ. cor	npl. of module(s)		
1 semester       undergraduate       Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment over the course of the semester, the lecturer will put their registration for assessment at least cate, students who meet all prerequisites will be admitted to assessment at least cate, students who meet all prerequisites will be admitted to assessment at a later date, students will meet all prerequisites will be admitted to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will meet admitted to assessment an aew.         Contents       Different topics of current subject-didactic research; examples: Interest and physics education, effects of subject media and their application for learning support, especially regarding computers, epistemological and working methods, new teaching methods.         Intended learning outcomes       Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.         Courses (type, number of weekly contact hours) and course language available)         Method of assessment (negress, anguage — if other than German)       S (no information on SWS (weekly contact hours) and course language available)         Method of assessment (preys, scope, language — if other than German)       S (no information (approx, 45 minutes) or b) term paper (approx, 8 pages, time to complete: 1	2 num	erical grade				
sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment into effect. Students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessment arew.         Contents       Different topics of current subject-didactic research; examples: Interest and physics education, effects of subject media and their application for learning support, especially regarding computers, epistemological and working methods.         Intended learning outcomes       Entended learning outcomes         Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches.         Courses (type, number of weekly contact hours) and course language available)         Method of assessment (type, scope, language — if other than German)         S (on information on SWS (weekly contact hours) or of oral examination of one candidate each (approx. 30 minutes) or d) real examination of one candidate each (approx. 45 minutes) or of al examination in groups (approx. 20 minutes,	Duration	Module level	Other prerequisites	5		
Different topics of current subject-didactic research; examples: Interest and physics education, girls in physics education, exaluation, task culture, interdisciplinary classes, language in physics education, effects of subject media and their application for learning support, especially regarding computers, epistemological and working methods, new teaching methods. Intended learning outcomes Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches. Courses (type, number of weekly contact hours, language — if other than German) S (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (approx. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2) Allocation of places	1 semesterundergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective deta at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment ov the course of the semester, the lecturer will put their registration for a sessment into effect. Students who meet all prerequisites will be admited to assessment at a later date, students will have to obtain the qualification			nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as-		
Knowledge of selected methods of didactic physical research, evaluation of didactic physical research projects, knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches. <b>Courses</b> (type, number of weekly contact hours, language — if other than German) S (no information on SWS (weekly contact hours) and course language available) <b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (ap- prox. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2) <b>Allocation of places</b> 	education, e media and tl methods, ne	valuation, task culture neir application for lea w teaching methods.	, interdisciplinary classe	es, language in physi	cs education, effects of subject	
knowledge of didactic physical literature. Ability to critically evaluate Physics classes in view of different aspect and to discuss different prioritisations and approaches. <b>Courses</b> (type, number of weekly contact hours) and course language available) <b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (ap- prox. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2) <b>Allocation of places</b> 	Intended lea	rning outcomes				
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Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus)         a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (approx. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2)         Allocation of places            Additional information            Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)         § 77 (1) 2. Physik Fachdidaktik         Module appears in	<b>Courses</b> (typ	e, number of weekly c	ontact hours, language -	– if other than Germa	ın)	
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus)         a) written examination (approx. 45 minutes) or b) term paper (approx. 8 pages, time to complete: 1 to 4 weeks) or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (approx. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2)         Allocation of places            Additional information            Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)         § 77 (1) 2. Physik Fachdidaktik         Module appears in	S (no inform	ation on SWS (weekly	contact hours) and cours	se language available	2)	
or c) presentation/seminar presentation (approx. 30 minutes) or d) oral examination of one candidate each (approx. 10 minutes) or oral examination in groups (approx. 20 minutes, groups of 2) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in	Method of a	ssessment (type, scop	e, language — if other th	an German, examina		
Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in	or c) present	ation/seminar present	tation (approx. 30 minut	es) or d) oral examina	ation of one candidate each (ap-	
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 Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in						
 Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in	Additional ir	oformation				
 Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in						
 Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik Module appears in	Workload					
 <b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes) § 77 (1) 2. Physik Fachdidaktik <b>Module appears in</b>						
§ 77 (1) 2. Physik Fachdidaktik Module appears in	Teaching cy	cle				
§ 77 (1) 2. Physik Fachdidaktik Module appears in						
Module appears in	Referred to i	n LPO I (examination	regulations for teaching-	degree programmes)		
	§ 77 (1) 2. Ph	ysik Fachdidaktik				
First state examination for the teaching degree Gymnasium Physics (2000)	Module app	ears in				
האיז אמני פאמוווותנוטו זטו נופ נכמכווווה מכבוכב טעוווומאמווד וועאנט (2004)	First state ex	amination for the teac	hing degree Gymnasium	Physics (2009)		

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	reg. data record Lehramt Gymnasien Physik - 2009	

Module	title				Abbreviation	
Studen	t Lab S	upervision (Physics)			11-P-FD-LLL-092-m01	
Module coordinator				Module offered by	• 	
holder	holder of the Chair of Physics and its Didactics			Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
Duration     Module level       1 semester     undergraduate			Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
thods a Intende The sturve gaine subject to hold and to r pupils e Courses S (no in Method ster, inf a) writte c) oral e tes, gro	ed learn dents l ed an o -didact scient raise th experin s (type formati formati en examin ups of	bloyed.tz. <b>ning outcomes</b> know how to prepare and bverview of current didac tic research. They are ab ific-propaedeutic classes heir interest for current p nents in a target-oriented , number of weekly conta tion on SWS (weekly conta tion on SWS (weekly conta tion on whether module conta mination (approx. 45 min lation of one candidate ef 2)	d follow-up a visit in a stic research topics ar le to evaluate and as s, to positively influer hysical research ques d manner, and to sup act hours, language – tact hours) and cours anguage – if other the an be chosen to earn nutes) or b) term pape	a teaching-learning-la and further possibilition sess the (affective) la ace the motivation of stions. The students ervise pupils while e - if other than German e language available an German, examinan a bonus) er (approx. 8 pages,	an)	
Allocati	ion of p	places				
Additio	nal inf	ormation				
 Workloa	ad					
Teachin	ıg cycl	e				
Referre	d to in	LPOI (examination regu	lations for teaching-	degree programmes)		
		sik Fachdidaktik sik Fachdidaktik				
Module						
A Gymnasi	ien Physic	cs (2009)		Irg • generated 26-Aug-2024		
			reg. data reco	ord Lehramt Gymnasien Phys	ik - 2009	

First state examination for the teaching degree Grundschule Physics (2009) First state examination for the teaching degree Hauptschule Physics (2009) First state examination for the teaching degree Realschule Physics (2009) First state examination for the teaching degree Gymnasium Physics (2009) First state examination for the teaching degree Mittelschule Physics (2013)

LA Gymnasien Physics (2009)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 20 / 37
	reg. data record Lehramt Gymnasien Physik - 2009	

Module	e title				Abbreviation
Advanc	ed Pra	ctical Course			11-P-FP-092-m01
Module	e coord	inator		Module offered by	
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS	-	od of grading	Only after succ. com	pl. of module(s)	
4	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Experin	nents c	of modern physics (Atom	and Molecular Physic	s, Solid-State Physic	cs, Nuclear Physics).
Intende	ed lear	ning outcomes			
tal resu	lts. Th				d documenting the experimen- e gained insights into the experi-
Course	<b>s</b> (type	, number of weekly conta	ict hours, language —	· if other than Germa	in)
P (no ir	format	tion on SWS (weekly cont	act hours) and cours	e language available	
		<b>sessment</b> (type, scope, la ion on whether module ca			tion offered — if not every seme-
a Testa discuss dule co	t (exan sion; ap mpone	n) is passed. Experiments oprox. 30 minutes) to tes	s that were not succes t the candidate's und uccessfully completed	ssfully completed ca erstanding of the ph	dered successfully completed if in be repeated once. Talk (with hysics-related contents of the mo- nce. Both components of the as-
Allocat	ion of <sub>l</sub>	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
		hysik "physikalische Pral	-		
Module					
		mination for the teaching	g degree Gymnasium	Physics (2009)	

General Concepts       11-P-GK-092-m01         Module coordinator       Module offered by         Managing Director of the Institute of Applied Physics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         8       numerical grade          1 semester       Module level       Other prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respectivation of the course. Registration for the course will sidered a declaration of will to seek admission to assessment. Idents have obtained the qualification for admission to assessment in the offect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semests sessment into effect. Students will have to obtain the qual admission to assessment arew. Successful completion of the modules 11-P-E and 11-P-MP1 is a prerequisite for participation 11-P-GK.         Contents       This module focuses on important concepts and applications that constitute interconnections betwee disciplines of Physics (and partly other Natural Sciences). When it comes to concepts, these intercom structural, they are elements of the physical terminology and belong to the mental structure of the sub physic, sciences and concepts; multipoles among other mode analysis; non-linear dynamics, self-organistion, deterministic ch gies of transport phenomena; Virial theorem as a structural element; microscopic modelling of macro nomena; scattering and structure determination; aspects of the history of ideas of important concepts enables the student bysics: and information/, tion technology; rules and process technology, sensors; medical technology; climat and wathe		lodule title			Abbreviation
Managing Director of the Institute of Applied Physics         Faculty of Physics and Astronomy           ECTS         Method of grading         Only after succ. compl. of module(s)           8         numerical grade            Duration         Module level         Other prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respecti a the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assesses the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semest sessment a later date, students will have to obtain the qual admission to assessment and larding sino to assessment an later date, students will have to obtain the qual admission to assess the sessment a later date, students will have to obtain the qual admission to assess for the oblues 11-P-E and 11-P-MP1 is a prerequisite for participatior 11-P-GK.           Contents         This module focuses on important concepts and applications that constitute interconnections between disciplines of Physics (and partly other Natural Sciences). When it comes to concepts, these interconno structural, they are elements of the physical terminology and belong to the mental structure of the sub plet Physics: synergetic interconnections between elements of knowledge of the corseponding subc and beyond which are necessary for the solution of many important problems. On both levels, the spice concepts and any other mode analysis; non-linear dynamics, self-organisation, deterministic ch gies of transport phenomena; Virial theorem as a structural element; microscopic m		eneral Concepts			11-P-GK-092-m01
ECTS         Method of grading         Only after succ. compl. of module(s)           8         numerical grade            Duration         Module level         Other prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment into effect. Students who meet all prerequisites will ted to assessment an a later date, students will have to obtain the qual admission to assess sessment into a sesses.           Contents         This module focuses on important concepts and applications that constitute interconnections betwee disciplines of Physics (and party other Natural Sciences). When it comes to concepts, these interconnections have the same significance. Structura, here and encessary for the solution of many important problems. On both levels, the spies of termination; spects of the history of ideas of important concepts conserved quantities, wave equa ves; multipoles among other mode analysis; non-linear dynamics, self-organisation, deterministic ch, gies of transport phenomena; Virial theorem as a structural element; microscopic modelling of macro nomena; scattering and structure determination; aspects of the history of ideas of important concepts contoversies (e.g. atomism, determinism); Applied and Technical Physics; ellipt sources; staled and addifferent usage contexts and information/ tion technology; rules and process technology, sensors; medical technology; climate and weather; Bi ecology; energy; celestial mechanics, satellites, GPS; measuring devices; el. light sources; displays		lodule coordinator	٨	Module offered by	
8       numerical grade          Duration       Module level       Other prerequisites         1 semester       undergraduate       Certain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assess the course of the semester, the lecturer will put their registratic sessment into effect. Students who meet all prerequisites will ted to assessment into effect. Students who meet all prerequisites will ted to assessment into effect. Students who meet all prerequisite of the modules 11-P-E and 11-P-MP1 is a prerequisite for participation 11-P-GK.         Contents       This module focuses on important concepts and applications that constitute interconnections between disciplines of Physics (and party other Natural Sciences). When it comes to concepts, these interconnections between elements of knowledge of the corresponding subs and beyond which are necessary for the solution of many important problems. On both levels, the spe tents and the resulting interconnections bave the same significance. Structures and concepts: Dimen lysis, scaling, similitude theory; fields, interactions; symmetries and conserved quantities, wave equa ves; multipoles among other mode analysis; non-linear dynamics, self-organisation, deterministic chn gies of transport phenomena; Virial theorem as a structural element; microscopic modelling of macro nomena; scattering and structure determination; aspects of the history of ideas of important concepts contoversies (e.g. atomism, determinism); Applied and Technical Physics; end information/ tion technology; climate and process technology, sensors; medical technology; climate and weather; Bi ecology; energy; celestial mechanics, satellites,	of A	lanaging Director of the Institute of	pplied Physics F	Faculty of Physics a	nd Astronomy
Duration         Module level         Other prerequisites           1 semester         undergraduate         Certain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semest sessment in the offect. Students will have to obtain the qual admission to assessment a later date, students will have to obtain the qual disciptions of Physics (and partly other Natural Sciences). When it comes to concepts, these interconstructural, they are elements of the physical terminology and belong to the mental structure of the supplement, the solution share the same significance. Structures and concepts: Dimes prevention have the same significance. Structures and concepts: Dime preventions have the same significance. Structures and concepts: Dime preventions have the same significance. Structures and concepts: Dime prevention on mena; scattering and structure determination; aspects of the history of ideas of important concepts: long on monean; Viral theorem as a structural element, microscopic modelling of macro no monean; scattering and structure determination; aspects of the history of ideas of important concepts enclosy, species enclosy; they know the similarities and differences of different usage contexts and therefore have increation of the inderstanding of important shared concepts enables the students to connect different subdisci Physics; they understand complex species of different and process relevant problems on therefore have increated beno mathematically describe and process relevant problems on theor		CTS Method of grading	Only after succ. compl. of module(s)		
1 semester       undergraduate       Certain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respectiat the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assessment in the subsequent of the course of the semester, the lecturer will put their registration sessment in the current or in the subsequent semest sessment at a later date, students will have to obtain the qual admission to assessment at a later date, students will have to obtain the qual admission to assessment arew. Successful completion of the modules 11-P-E and 11-P-MP1 is a prerequisite for participatior 11-P-GK.         Contents         This module focuses on important concepts and applications that constitute interconnections betwee disciplines of Physics (and partly other Natural Sciences). When it comes to concepts, these interconnetrons between elements of knowledge of the corresponding subband beyond which are necessary for the solution of many important problems. On both levels, the spetents and the resulting interconnections between elements of knowledge of the corresponding subband beyong the momal; sinitractions; symmetries and concepts: Dimen lysis, scaling, similitude theory; fields; interactions; symmetries and conserved quantities, wave equaly es; multipoles among other mode analysis; non-linear dynamics, self-organisation, deterministic / the gives of transport phenomena; Virial theorem as a structural element; microscopic modelling of macro nomena; scattering and structure determination; aspects of the history of ideas of important concepts concepts; negating and structure determination; aspects of the history of ideas of important concepts on momena; scattering and structure determination; aspects of the history of ideas of important concepts end		numerical grade			
sessment. The lecturer will inform students about the respecti at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semest sessment at a later date, students will have to obtain the qual admission to assess sessment at a later date, students will have to obtain the qual admission to assessment anew. Successful completion of the modules 11-P-E and 11-P-MP1 is a prerequisite for participation 11-P-GK. Contents This module focuses on important concepts and applications that constitute interconnections between disciplines of Physics (and partly other Natural Sciences). When it comes to concepts, these interconnections between eliseiplines of the physical terminology and belong to the mental structure of the sul plied Physics: synergetic interconnections between elements of knowledge of the corresponding subd and beyond which are necessary for the solution of many important problems. On both levels, the spi tents and the resulting interconnections have the same significance. Structures and concepts: Dimen lysis, scaling, similitude theory; fields; interactions; symmetries and conserved quantiles, wave equa ves; multipoles among other mode analysis; non-linear dynamics, self-organisation, deterministic ch- gies of transport phenomena; Virial theorem as a structural element; microscopic modelling of macro nomena; scattering and structure determination; aspects of the history of ideas of important concepts ecology; nergy; celestial mechanics, satellites, GPS; measuring devices; el. light sources; displays Intendel learning outcomes Their understanding of important shared concepts enables the students to connect different subdisci Physics, they wnow the similarities and differences of different usage contexts and therefore have in- eledge of these concepts and are able t		uration Module level	Other prerequisites		
	the e phiector t ctio eldse ar l th dete mir teo cs, an ole nd rge	ontents his module focuses on important co isciplines of Physics (and partly oth tructural, they are elements of the p lied Physics: synergetic interconnect nd beyond which are necessary for ents and the resulting interconnection rsis, scaling, similitude theory; field es; multipoles among other mode a ies of transport phenomena; Virial to omena; scattering and structure defontroversies (e.g. atomism, determing on technology; rules and process tectology; energy; celestial mechanics ntended learning outcomes heir understanding of important sha hysics, they know the similarities and edge of these concepts and are able heoretical Physics; they understand wn physical knowledge in a synerger re able to explain the interactions o	sessment. The lecture at the beginning of the sidered a declaration dents have obtained to the course of the sem sessment into effect. The ted to assessment in the sessment at a later date admission to assessme modules 11-P-E and 11 11-P-GK.	er will inform stude e course. Registrat of will to seek adm the qualification fo lester, the lecturer Students who mee the current or in th ate, students will h nent anew. Success 1-P-MP1 is a prereq that constitute int belong to the men of knowledge of th oortant problems. Of ficance. Structures ies and conserved mics, self-organisa lement; microscop he history of ideas nical Physics: Phys- ical technology; cli ring devices; el. lighted to students to comm at usage contexts a ribe and process re- cure and engineering the solutions to se	nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for sful completion of the courses of uisite for participation in module erconnections between the sub- cepts, these interconnections ar tal structure of the subject. Ap- ne corresponding subdiscipline On both levels, the specific con- and concepts: Dimensional ana- quantities, wave equation, wa- tion, deterministic chaos; analo- ic modelling of macroscopic phe of important concepts and their sics and information/communica mate and weather; Biophysics; ht sources; displays
	ont	ourses (type, number of weekly con	act hours, language — i	f other than Germa	n)
V + Ü (no information on SWS (weekly contact hours) and course language available)	kly	+ Ü (no information on SWS (weekl	contact hours) and cou	ırse language avail	able)
<b>Method of assessment</b> (type, scope, language $-$ if other than German, examination offered $-$ if not e ster, information on whether module can be chosen to earn a bonus)					tion offered — if not every seme-
a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate examination in groups (approx. 20 minutes per candidate)				or b) oral examinat	ion of one candidate each or ora

#### Allocation of places

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#### Additional information

#### Workload

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#### Teaching cycle

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

§ 77 (1) 1. b) Physik "Fortgeschrittene Experimentalphysik"

Module appears in

First state examination for the teaching degree Gymnasium Physics (2009)

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Modul	le title				Abbreviation
Thesis	s in Phy	sics Grammar School			11-P-HAGY-092-m01
Modul	le coord	linator		Module offered by	Į
chairp	erson o	f examination committee	2	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade	Where applicable, s	pecific modules/mo	dule components as specified by
			supervisor.		
Duration         Module level         Other prerequisites					
1 seme	ester	undergraduate			
Conte	nts				
Indepe	endent	processing of a topic of P	hysics and/or Didact	ics of Physics, chose	en in consultation with a lecturer.
Intend	led lear	ning outcomes			
and m	ethods				while applying the knowledge ent their results in written form in
Course	<b>es</b> (type	, number of weekly conta	act hours, language –	- if other than Germa	an)
no cou	urses as	signed			
		<b>sessment</b> (type, scope, la ion on whether module c			tion offered — if not every seme-
Langu	age of a	(approx. 40 pages) ssessment: German, exc teaching degree program		e with Section 29 St	ubsection 4 LPO I (examination re-
Alloca	tion of	places			
Additi	onal inf	ormation			
Additi	onal inf	ormation on module dura	ation: 1 to 2 semester	s.	
	heo				
Workl	uau				
Workle	Jau		_		
	ing cycl	e			
		e			
 Teachi 	ing cycl		lations for teaching-	degree programmes)	
 Teachi 	ing cycl	e LPOI (examination regu	lations for teaching-o	degree programmes)	)
 Teachi  Referr	ing cycl	LPOI (examination regu	llations for teaching-o	degree programmes)	)

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Module	e title				Abbreviation
Practic	e in Stu	ıdent Lab			11-P-LLL-092-m01
Madula		lastar		Module offered by	
Module coordinator			:	•	
		Chair of Physics and its D		Faculty of Physics a	ind Astronomy
<b>ECTS</b> 2		od of grading rical grade	Only after succ. com	ipt. of module(s)	
∠ Duratio	L	Module level			
1 seme		undergraduate	Other prerequisites Modules 11-P-E, 11-F	P-FD1 11-P-DP1 are re	commended
		undergraduate			commended.
Conten					
	perforr	ned in teaching-learning-			n introduction to science and eriments, different working me-
		ning outcomes			
ve gain subject to hold and to	ed an c -didact scienti raise th	overview of current didac ic research. They are abl fic-propaedeutic classes	tic research topics an e to evaluate and ass , to positively influen hysical research ques	d further possibilitie ess the (affective) le ce the motivation of tions. The students	aboratory (M!ND-Center) and ha- es for development in the field of earning achievements of pupils, pupils in the subject of Physics are able to select, set up or build experimenting
		, number of weekly conta			
		ion on SWS (weekly cont			
ster, ini a) oral module	formati examin es with candida	on on whether module ca ation of one candidate e less than 4 ECTS credits ate each or oral examinat	an be chosen to earn ach or oral examinati approx. 20 minutes,	a bonus) on in groups (appro: unless different leng	tion offered — if not every seme- x. 30 minutes per candidate, for th and mode of oral examination pprox. 6 to 12 pages, time to com-
Allocat					
	•				
Additio	nal inf	ormation			
Worklo	ad		·		
Teachi	ng cycl	9			
	-3 -9 -1	-			
Referre	d to in	LPOI (examination regu	lations for teaching-	legree programmes)	
Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. c) Physik physikalische Grundpraktika         § 77 (1) 1. d) Physik "physikalische Praktika"					
Module	e appea	in in			
First sta First sta	ate exa ate exa	mination for the teaching mination for the teaching mination for the teaching mination for the teaching	g degree Hauptschule g degree Realschule P	Physics (2009) Physics (2009)	
First sta	ate exa	mination for the teaching	g degree Mittelschule	Physics (2013)	

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	reg. data record Lehramt Gymnasien Physik - 2009	1.00 37.57

on for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment and a later date, students will have to obtain the qualification for admission to assessment and a later date.         Contents       Fundamental experiments: Atoms: Specification of atomic values, masses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic moment and spin, atomic structure, Periodic Table of the Elements         Intended learning outcomes       Interpretation of measuring methods and scales of central values and are able to apply and process relevant problems.         Courses (type, number of weekly contact hours, language — if other than German)       V + 0 (no information on SWS (weekly contact hours) and course language available)         Method of assessment (type, scope, language — if other than German, examination of one candidate each or c) oral examination in groups (approx. 30 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination on formation on whether module can be chosen to earn a bonus)         a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination in groups (approx. 30 minutes; per candidate)         Aldictiona	Module	title				Abbreviation	
Module coordinator         Module offered by           Managing Director of the Institute of Applied Physics         Faculty of Physics and Astronomy           CCTS         Method of grading         Only after succ. compl. of module(s)           a numerical grade			CS 1				
Managing Director of the Institute of Applied Physics         Faculty of Physics and Astronomy           ECTS         Method of grading         Only after succ. compl. of module(s)           a numerical grade							
ECTS         Method of grading         Only after succ. compl. of module(s)           a         numerical grade            a semester         Undergraduate         Other prerequisites           a semester         undergraduate         Prior completion of module 11-P-E is recommended. Certain prerequisite must be met to qualify for admission to assessment. If students have obtained the qualificati on for admission to assessment wort the course of the semester, the lec- turer will put their registration for assessment and the qualificati on for admission to assessment over the course of the semester, the lec- turer will put their registration for admission to assessment and the register state of ate, students will have to obtain the qualification of admission to assessment and the current or in the subsequent seessessment at a later date, students will have to obtain the qualification of admission to assessment and subsequent seessessment at a later date, students will have to obtain the qualification of admission to assessment and submission so assessment and subsequent seesses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical interded learning outcomes           The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant of the submission on sweet weekly contact hours; language — if other than German)           V + 0 (no information on SWS (weekly contact hours; language)         if other than German) <td colspan="3"></td> <td>A 11 1 D1 1</td> <td colspan="3"></td>				A 11 1 D1 1			
8         numerical grade					· · · · · ·	ind Astronomy	
Duration         Module level         Other prerequisites           1 semester         undergraduate         Prior completion of module 11-P-E is recommended. Certain prerequisite must be met to qualify for admission to assessment. The lecturer will in- form students about the respective details at the beginning of the cour- se. Registration for the course will be considered a declaration of will to seek admission to assessment is the beginning of the cour- se. Registration for the course will be considered a declaration of will to seek admission to assessment at the the qualificati on for admission to assessment at a leter date, students will have to obtain the qualification for admission to assessment an the truerred vir the subsequent seessessment at a later date, students will have to obtain the qualification for admission to assessment anew.           Contents           Fundamental experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanical of hydrogen atoms, magnetic mo ment and spin, atomic structure, Periodic Table of the Elements           Intended learning outcomes           The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to a ply and process relevant problems.           Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)           a) written examinatio				Unly after succ. con	npl. of module(s)		
a semester       undergraduate       Prior completion of module 11-P-E is recommended. Certain prerequisite: must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification of admission to assessment into effect. Students who meet all prerequisites will be admitted to assessment into effect. Students who meet all prerequisites will be admitted to assessment and the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment and the subsequent semester. For assessment, charge, e/m determination interference experiments; notne: Specification of atomic values, masses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect; Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic moment and spin, atomic structure, Periodic Table of the Elements         The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to apply and process relevant problems.         Courses (type, number of weekly contact hours) and course language available)         Method of assessment (type, scope, language – if other than German)         V + 0 (no information on SWS (weekly contact hours) and cou	I	L		Other prorequisites			
must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualificatio on for admission to assessment over the course of the semester, the lecturer will put their registration for assessment in the current or in the subsequent semester. For assessment at a later date, students who meet all prerequisites will be admitted to assessment anew.         Contents       Eundaments: Atoms: Specification of atomic values, masses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic moment and spin, atomic structure, Periodic Table of the Elements         Intended learning outcomes       The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to ap by and process relevant problems.         Courses (type, number of weekly contact hours, language — if other than German) <ul> <li>4 0 (no information on SWS (weekly contact hours) and course language available)</li> <li>Method of assessment (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination of paces</li> <li>S 3 (1) i. 0) Physik Mechanik, Wärmelehre, Elektrizitä</li></ul>						ommended. Certain	nrerequisites
Contents         Fundamental experiments: Atoms: Specification of atomic values, masses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic moment and spin, atomic structure, Periodic Table of the Elements         Intended learning outcomes       Intended learning outcomes         The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to ar ply and process relevant problems.         Courses (type, number of weekly contact hours, language — if other than German)       V + Û (no information on SWS (weekly contact hours) and course language available)         Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)         a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination in groups (approx. 30 minutes per candidate)         Aldocation of places			must be met to qua form students abou se. Registration for seek admission to on for admission to turer will put their re meet all prerequisit the subsequent sen	must be met to qualify for admission to assessment. The lecturer will in- form students about the respective details at the beginning of the cour- se. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualificati- on for admission to assessment over the course of the semester, the lec- turer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in			
Fundamental experiments: Atoms: Specification of atomic values, masses and energies, Rutherford scattering; photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic moment and spin, atomic structure, Periodic Table of the Elements Intended learning outcomes The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to apply and process relevant problems. Courses (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination in groups (approx. 30 minutes per candidate) Allocation of places				have to obtain the c	qualification for admi	ission to assessmen	t anew.
photons: Radiation laws, photoelectric effect, Compton effect; electrons: Elementary charge, e/m determination interference experiments, matter wave, Schrödinger equation, uncertainty relation, simple quantum mechanical systems, questions of interpretation, recent experiments; quantum mechanics of hydrogen atoms, magnetic mo ment and spin, atomic structure, Periodic Table of the Elements Intended learning outcomes The students gain insights into the basic differences between classical and quantum physical description, they have consolidated and structured knowledge of the mentioned contents; they have knowledge of the relevant central thoughts and key experiments and of measuring methods and scales of central values and are able to ap ply and process relevant problems. Courses (type, number of weekly contact hours, language — if other than German) V + Û (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or c) oral examination in groups (approx. 30 minutes per candidate) Allocation of places 	Conten	ts					
Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)	interfer systems ment ar Intende The stu have co central ply and Courses V + Ü (n Method ster, inf a) writte oral exa	ence ex s, ques nd spin ed learr dents g onsolid though proces s (type, no infor d of ass formati en exar aminati	Aperiments, matter war tions of interpretation , atomic structure, Per <b>ning outcomes</b> gain insights into the b ated and structured kr its and key experiment as relevant problems. number of weekly cor mation on SWS (weekly con on whether module nination (approx. 120 on in groups (approx.	ve, Schrödinger equation, recent experiments; q iodic Table of the Elem asic differences betwee owledge of the mention is and of measuring me tact hours, language – y contact hours) and co language – if other th can be chosen to earn minutes; usually chose	on, uncertainty relati uantum mechanics of ents en classical and qua ned contents; they h ethods and scales of - if other than Germa ourse language avail an German, examina a bonus) en) or b) oral examina	on, simple quantum of hydrogen atoms, r ntum physical descr ave knowledge of th central values and a n) able) tion offered — if not	mechanical nagnetic mo- iption, they e relevant ire able to ap- every seme-
Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)							
Teaching cycle         Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)       JMU Würzburg • generated 26-Aug-2024 • exam.	Additio	nal info	ormation				
Teaching cycle         Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)       JMU Würzburg • generated 26-Aug-2024 • exam.							
Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)	Worklo	ad					
Referred to in LPO I (examination regulations for teaching-degree programmes)         § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie         § 53 (1) 1. b) Physik Aufbau der Materie         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in         A Gymnasien Physics (2009)							
§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 53 (1) 1. b) Physik Aufbau der Materie § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in A Gymnasien Physics (2009) JMU Würzburg • generated 26-Aug-2024 • exam. page 26 / 37	Teachir	ng cycle	9				
§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 53 (1) 1. b) Physik Aufbau der Materie § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in A Gymnasien Physics (2009) JMU Würzburg • generated 26-Aug-2024 • exam. page 26 / 37							
A Gymnasien Physics (2009) JMU Würzburg • generated 26-Aug-2024 • exam. page 26 / 37	§ 53 (1) § 53 (1) § 77 (1)	Referred to in LPO I (examination regulations for teaching-degree programmes) § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 53 (1) 1. b) Physik Aufbau der Materie § 77 (1) 1. c) Physik "Theoretische Physik"					
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	e title				Abbreviation
Moder	n Physi	CS 2			11-P-MP2-092-m01
Modul	e coord	inator		Module offered by	
Manag	ing Dire	ector of the Institute of	of Applied Physics	· · · · · · · · · · · · · · · · · · ·	
ECTS	-	od of grading	Only after succ. con		
6		rical grade			
Duratio	on	Module level	Other prerequisites	<b>j</b>	
1 seme Conten Mecha	ts	undergraduate	mended. Certain pro assessment. The lea tails at the beginnin considered a declar dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	erequisites must be cturer will inform stu- ng of the course. Reg ration of will to seek d the qualification for emester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	11-P-E and 11-P-MP1 is recom- met to qualify for admission to dents about the respective de- istration for the course will be admission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- te subsequent semester. For as- nave to obtain the qualification fo
molecu insulat	ules, m ors.	easuring methods, st			vibrations, thermal properties of
		ning outcomes			
examir	nation o		anding of the structure o		of experimental methods for the heir modelling as translation-in-
Course	<b>s</b> (type	, number of weekly c	ontact hours, language –	– if other than Germa	an)
V + Ü (I	no info	rmation on SWS (wee	kly contact hours) and co	ourse language avail	lable)
			e, language — if other th Ile can be chosen to earn		ation offered — if not every seme-
-			minutes; usually choser minutes per candidate)	n) or b) oral examina	tion of one candidate each or ora
Allocat	ion of	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
	-				
Referre	ed to in	LPO I (examination	regulations for teaching-	degree programmes)	)
	-				
	) 1. b) P	nysik Fortgeschritte	ne Experimentalphysik"		
		· · · · · · · · · · · · · · · · · · ·	ne Experimentalphysik"		

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	reg. data record Lehramt Gymnasien Physik - 2009	

Module	title				Abbreviation
Modern	n Physi	cs 3			11-P-MP3-092-m01
Module	coord	inator		Module offered by	<u> </u>
		ector of the Institute of	of Applied Physics	Faculty of Physics a	and Astronomy
			Only after succ. con		· · · · · · · · · · · · · · · · · · ·
5		rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	sessment. The lecture at the beginning of sidered a declaration dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later	trer will inform stude the course. Registrat on of will to seek adm d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
			admission to asses	sment anew.	
The stu perime	ed lear dents nts as	<b>ning outcomes</b> have structured know well as measuring me	ethods and dimensions o		w relevant key concepts and ex- y are able to work on simple rele-
		s in a quantitative ma	nner. ontact hours, language –	- if other than Germa	n
		· · · · · · · · · · · · · · · · · · ·	kly contact hours) and co		
Method	l of ass	<b>sessment</b> (type, scop		an German, examina	tion offered — if not every seme-
			minutes; usually choser minutes per candidate)	n) or b) oral examinat	tion of one candidate each or oral
Allocati	ion of <sub>l</sub>	places			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e			
			regulations for teaching-	degree programmes)	
		• -	ne Experimentalphysik"		
Module					
First sta	ate exa	mination for the teac	hing degree Gymnasium	Physics (2009)	

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	reg. data record Lehramt Gymnasien Physik - 2009	

Module	e title				Abbreviation	
Lab Co					11-P-PA-112-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy						
ECTS		od of grading	Only after succ. con	npl. of module(s)		
5	<u> </u>	successfully completed	-			
Duratio		Module level	Other prerequisites			
1 seme		undergraduate				
pagatic	al laws on, grap		lynamics, science of el average values and sta cations			
Intende	ed leari	ning outcomes				
le to in measu	depenc ring pro	lently plan and conduc otocol. They are able to	ed physical measuring t experiments, to coop evaluate the measurin present and discuss the	erate with others, an g results on the basi	d to document the re	esults in a
Course	<b>s</b> (type	, number of weekly cor	tact hours, language –	- if other than Germa	n)	
Ü (1 we Beispie	ekly co ele aus	ntact hour), once a yea	lerrechnung (Measurei r (winter semester) e und Elektrik (Example			
			language — if other th can be chosen to earn		tion offered — if not	every seme-
1. Topic 2. Lab c ted it latec Succes 1.	cs cove course: f a Test l conter sful co	a) Preparing, performi at (exam) is passed. b) nts of the course (appr mpletion of approx. 50	rcises: written examina ng and evaluating the e Talk (with discussion)	experiments will be c to test the students' prerequisite for adm	onsidered successfu understanding of th ission to assessmer	ne physics-re- nt component
portuni Studen Studen re atter Electric	ty to re ts mus ts mus nding B ity).	take element a) and/o t register for assessme t attend Auswertung vo eispiele aus Mechanik		online (details to be lerrechnung (Measur trik (Examples from N	e announced). ements and Data An Mechanics, Thermod	alysis) befo- ynamics and
Allocat	ion of p	olaces		·	· · · · · ·	
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	9				
	-3 -9 -1	-				
Referre	d to in	IPOI (examination ro	gulations for teaching-	degree programmec)		
			elehre, Elektrizitätsleh		len Relativitätetheer	ie
LA Gymnas				irg • generated 26-Aug-2024		page 30 / 37
. 5,				ord Lehramt Gymnasien Physi		IC 1 °C °C °C

§ 53 (1) 1. c) Physik physikalische Grundpraktika

§ 77 (1) 1. a) Physik "Grundlagen der Experimentalphysik"

§ 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in
Bachelor' degree (1 major)

egree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2012)

Bachelor' degree (1 major) Mathematical Physics (2012)

Bachelor' degree (1 major) Computational Mathematics (2012)

Bachelor' degree (1 major) Computational Mathematics (2013)

First state examination for the teaching degree Grundschule Physics (2009)

First state examination for the teaching degree Hauptschule Physics (2009)

First state examination for the teaching degree Realschule Physics (2009)

First state examination for the teaching degree Gymnasium Physics (2009)

First state examination for the teaching degree Mittelschule Physics (2013)

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Module	Module title Abbreviation					
Lab Co	Lab Course B     11-P-PB-L-092-m01					
Module	e coord	inator		Module offered by	<u> </u>	
Manag	anaging Director of the Institute of Applied Physics		Faculty of Physics a	ind Astronomy		
ECTS		od of grading	Only after succ. compl. of module(s)			
6	(not) s	successfully completed	I 11-P-PA			
Duratio		Module level	Other prerequisites	5		
1 seme		undergraduate				
Conten						
			icity, circuits with elect	trical components an	d Atomic and Nucle	ar Physics.
	-	ning outcomes				
are abl	e to inc		kills of physical measu conduct experiments in			
Course	<b>s</b> (type	, number of weekly cor	ntact hours, language –	- if other than Germa	ın)	
			Electricity and Circuits, Iuclear Physics, AKP): F			
			language — if other th can be chosen to earn		tion offered — if not	every seme-
ly co phys 2. Lab c ly co phys Studen Studen nent, tl Studen und Ke To pass	<ol> <li>Lab course in part 1: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).</li> <li>Lab course in part 2: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).</li> <li>Students must register for assessment components 1 and 2 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b).</li> <li>Students must attend Elektrizitätslehre und Schaltungen (Electricity and Circuits) courses before attending Atom und Kernphysik (Atomic and Nuclear Physics) courses.</li> <li>To pass this module, students must pass both assessment component 1 and assessment component 2.</li> </ol>					nding of the successful- nding of the ounced). ment compo- cending Atom-
Additio	nal inf	ormation				
	mat mit					
Worklo	ad					
WOIKIO						
Toachi	ng cycl					
Teacini	ing cycl	6				
Peferred to in LPO L (examination regulations for teaching dogree programmes)						
Referred to in LPO I (examination regulations for teaching-degree programmes)§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie§ 53 (1) 1. b) Physik Aufbau der Materie§ 53 (1) 1. c) Physik physikalische Grundpraktika§ 77 (1) 1. b) Physik "Fortgeschrittene Experimentalphysik"§ 77 (1) 1. d) Physik "physikalische Praktika"						
Module	e appea	nrs in				
LA Gymnas	ien Physic	rs (2009)		urg • generated 26-Aug-2024 ord Lehramt Gymnasien Phys		page 32 / 37

First state examination for the teaching degree Grundschule Physics (2009) First state examination for the teaching degree Hauptschule Physics (2009) First state examination for the teaching degree Realschule Physics (2009) First state examination for the teaching degree Gymnasium Physics (2009) First state examination for the teaching degree Mittelschule Physics (2013)

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	reg. data record Lehramt Gymnasien Physik - 2009	

Modul	e title				Abbreviation
Theore	etical Pl	nysics 1 (Teaching Post)		-	11-P-TP1-092-m01
Modul	e coord	inator		Module offered by	
	Module coordinator			Faculty of Physics a	and Astronomy
Managing Director of the Institute of Theoretical Physics and Astrophysics			ieoretical Physics		and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 semester undergraduate C s a s d t t t s t t		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
admission to assessment anew.					
Conte					
		hanics and quantum mee	chanics		
		ning outcomes			
		s, methods and mindset , knowledge of the speci			es and ways of thinking of Theo-
Course	<b>es</b> (type	, number of weekly conta	ict hours, language –	- if other than Germa	an)
V + Ü (	(no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)
		<b>sessment</b> (type, scope, la ion on whether module c			tion offered — if not every seme-
		mination (approx. 120 mi ion in groups (approx. 30			ation of one candidate each or
Alloca	tion of <sub>l</sub>	places			
Additi	onal inf	ormation			
Workl	oad				
Teachi	ing cycl	e			
			<u>.</u>		
Referr	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)	
		hysik "Theoretische Phys			
	e appea	• •			
		mination for the teaching	g degree Gymnasium	Physics (2009)	
			,	///	

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Module coordinator       Module offered by         Managing Director of the Institute of Theoretical Physics and Astrophysics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         7       numerical grade	Module ti	tle			Abbreviation
Managing Director of the institute of Theoretical Physics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         7       numerical grade          Duration       Module level       Other prerequisites         1 semester       undergraduate       Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment over the course of the semester, the lecturer will put their registration for assessment or the course of the semester. For assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment admission to assessment anew.         Contents       Electrodynamics, thermodynamics and Statistical Physics, working strategies and ways of thinking of Theoretical Physics, knowledge of the specific role of theory in Physics.         Courses (type, number of weekly contact hours, language — if other than German)       V + 0 (no information on SWS (weekly contact hours) and course language available)         Method of assessment (type, scope, language — if other than German, examination of one candidate each or oral examination in groups (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate)         Additional information       Electrodynamics for teaching-degree programmes)         % Z7(	Theoretical Physics 2     11-P-TP2-092-m01				11-P-TP2-092-m01
and Astrophysics       Method of grading       Only after succ. compl. of module(s)         7       numerical grade       -         Duration       Module level       Other prerequisites must be met to qualify for admission to as-       sessment. The lecturer will inform students about the respective details	Module coordinator			Module offered by	<u>,</u>
Z       numerical grade			neoretical Physics	Faculty of Physics a	and Astronomy
Duration         Module level         Other prerequisites           1 semester         undergraduate         Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew.           Contents           Electrodynamics, thermodynamics and Statistical Physics.           Intended learning outcomes           Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theo- retical Physics, knowledge of the specific role of theory in Physics.           Course (type, number of weekly contact hours, language — if other than German)           V + Ü (no information on SWS (weekly contact hours, language — if other man, examination of one candidate each or oral examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination information	ECTS N	lethod of grading	Only after succ. con	npl. of module(s)	
1 semester       undergraduate       Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment at a later date, students will have to obtain the qualification for admission to assessments. Intended learning outcomes         Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theoretical Physics, knowledge of the specific role of theory in Physics.         Courses (type, number of weekly contact hours, language — if other than German)         V + 0 (no information on SWS (weekly contact hours) and course language available)         Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to ear a bonus)         a) written examination (approx. 120 minutes; usually chosen) or b) or al examination of one candidate each or or al examination in groups (approx. 30 minutes per candidate)         Additional information	7 n	umerical grade			
sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment and admission to assessment. For assessment and a later date, students will have to obtain the qualification for admission to assessment and admission to assessment. For assessment, such assessment in the current or in the subsequent semester. For assessment and later date, students will have to obtain the qualification for admission to assessment and admission to assessment. For assessment in the current or in the subsequent semester. For assessment and later date, students will have to obtain the qualification for admission to assessment. For assessment a later date, students will have to obtain the qualification for admission to assessment and the qualification for admission to assessment and the qualification for admission to assessment. For assessment, the lecture will precedulate the qualification for admission to assessment and the qualification for admission to assessment and the qualification for admission to assessment and the qualification for the course language and advector of the orgen in forther than German).       V ± 0 (no information on SWS (weekly contact hours) and course	Duration		1		
Contents Electrodynamics, thermodynamics and Statistical Physics. Intended learning outcomes Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theo- retical Physics, knowledge of the specific role of theory in Physics. Courses (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	I Sellesk		sessment. The lecture at the beginning of the sidered a declaration dents have obtained the course of the service sessment into effect ted to assessment in sessment at a later	rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as-
Electrodynamics, thermodynamics and Statistical Physics. Intended learning outcomes Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theo- retical Physics, knowledge of the specific role of theory in Physics. Courses (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in			admission to assess	sment anew.	
Intended learning outcomes Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theoretical Physics, knowledge of the specific role of theory in Physics. Courses (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) Allocation of places					
Basic concepts, methods and mindsets of Theoretical Physics, working strategies and ways of thinking of Theo- retical Physics, knowledge of the specific role of theory in Physics. <b>Courses</b> (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) <b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) <b>Allocation of places</b>  <b>Additional information</b>  <b>Workload</b>  <b>Teaching cycle</b>  <b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" <b>Module appears in</b>		· · · ·	Statistical Physics.		
retical Physics, knowledge of the specific role of theory in Physics. Courses (type, number of weekly contact hours, language — if other than German) V + Ü (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Intended	learning outcomes			
V + Ü (no information on SWS (weekly contact hours) and course language available)  Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate)  Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					es and ways of thinking of Theo-
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme-         ster, information on whether module can be chosen to earn a bonus)         a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or         oral examination in groups (approx. 30 minutes per candidate)         Allocation of places            Additional information            Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)         § 77 (1) 1. c) Physik "Theoretische Physik"         Module appears in	Courses (	type, number of weekly conta	act hours, language –	- if other than Germa	in)
ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 120 minutes; usually chosen) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	V + Ü (no	information on SWS (weekly	contact hours) and co	ourse language avail	able)
oral examination in groups (approx. 30 minutes per candidate) Allocation of places Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					tion offered — if not every seme-
Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					ation of one candidate each or
 Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Allocatio	n of places			
 Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					
 Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Additiona	l information			
 Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					
 Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Workload				
 Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					
 Referred to in LPO I (examination regulations for teaching-degree programmes) § 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Teaching	cycle			
§ 77 (1) 1. c) Physik "Theoretische Physik" Module appears in					
§ 77 (1) 1. c) Physik "Theoretische Physik" Module appears in	Referred	to in LPO I (examination regu	llations for teaching-	degree programmes)	
Module appears in					
		· · ·			
			g degree Gymnasium	Physics (2009)	

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	reg. data record Lehramt Gymnasien Physik - 2009	

Module	e title				Abbreviation	
Prepar	atory C	ourse Mathematics			11-P-VKM-092-m01	
Module coordinator				Module offered by	-	
			Applied Physics and	Faculty of Physics a	and Astronomy	
Managing Directors of the Institute of A the Institute of Theoretical Physics and					and Astronomy	
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
2	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate		undergraduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	its					
and alg Integra Intendo The stu succes Course T (no ir Methoo ster, in discuss	gebra 2 ed learn idents i sfully s s (type nformat d of ass format sion an	. Coordinate systems and us ning outcomes know the principles of m tudying Theoretical and , number of weekly conta ion on SWS (weekly conta ion on SWS (weekly conta on on whether module c d exercises (approx. 15 m	d complex numbers 3 athematics and elem Experimental Physics act hours, language – act hours) and cours anguage – if other the an be chosen to earn ninutes)	. Vectors - vectored v entary calculation m - if other than Germa e language available an German, examina a bonus)	•	
and wi examir	ll be an nation r	nounced in due form une egulations) 2009.			3 ASPO (general academic and	
Allocat	ion of <sub>l</sub>	blaces				
 Additio	onal inf	ormation				
Workla	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	llations for teaching-	degree programmes)		
		0				
Module	e appea	urs in				
	or' deg	ree (1 major) Physics (20				
Bachel A Gymnas		ree (1 major) Physics (20		rg • generated 26-Aug-2024	• exam. page 36 / 37	

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Bachelor' degree (1 major) Nanostructure Technology (2012) First state examination for the teaching degree Grundschule Physics (2009) First state examination for the teaching degree Hauptschule Physics (2009) First state examination for the teaching degree Realschule Physics (2009) First state examination for the teaching degree Gymnasium Physics (2009) First state examination for the teaching degree Mittelschule Physics (2013) No final examination Special study offering (2010)

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