

# Module Catalogue

for the Subject

## **Computational Mathematics**

as a Bachelor's with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

> Examination regulations version: 2012 Responsible: Institute of Mathematics

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82|f24|-|-|H|2012



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(2012)

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### The subject is divided into

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### **Content and Objectives of the Programme**

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The Bachelor programme in Computational Mathematics is offered by the Department of Mathematics, with a total of currently (SS 2010) 9 chairs.

At the end of this course of study, the students should be familiar with the main branches of mathematics, taught methods of mathematical reasoning and working as well as analytical thinking, abstract concepts and the ability to recognize and construct complex structures and interconnections. In addition, they should also have interdisciplinary knowledge on the borderline between mathematics, computer science, natural science, and engineering.

Through the course these skills which the students acquire provide the basic knowledge required for a consecutive Bachelor-Masters degree. Moreover, they can later familiarize themselves with the many areas of society in which innovative computer-aided mathematical methods can be applied to or be of use. This is supported through the study of an integrated elective application-oriented subject in which the students become familiar with the basic thoughts and techniques of a subject of their choice, either in natural sciences or engineering, where mathematical methods apply.

In the Bachelor study in computational mathematics, the main emphasis is put on basic mathematical knowledge, method knowledge and the development of the mental constructs which are typical for mathematics. The acquisition of special topics in different secondary branches of mathematics is subordinate.

For the Bachelor thesis the student should work on a thematic and temporally closely limited frame in order to carry out a mathematical task, preferably in some application-oriented context, using well-known procedures and scientific criteria under guidance but, to a large extent, independently.

The exam enables the acquisition of a comparable, international degree in the field of mathematics and provides the framework of a consecutive Bachelor-Masters degree as an initial professional qualification which can be used as a mean for entry into the working world or as preparation for a subsequent Masters study. The exam should ascertain whether the candidate overlooks the context of the basics in mathematics and possesses the ability to use the corresponding scientific methods, with regards to mathematics and the selected elective application-oriented subjects.

### 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:

#### ASP02009

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

#### 24-Oct-2012 (2012-168)

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



### **Compulsory Courses**

(99 ECTS credits)

Module title			Abbreviation			
Analys	is				10-M-ANA-122-m01	
Module coordinator				Module offered by		
Dean o	fStudi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS Method of grading Only after succ. compl. of module(s)						
20 numerical grade						
Duratio	on	Module level	Other prerequisites			
2 semester undergraduate By way of exception, additional prerequisites are listed in assessments.			sites are listed in th	e section on		
Conten	ts					
Real nu ries, di	umbers fferenti	and completeness, basic al and integral calculus i	c topological notions n one variable, introc	, convergence and d luction to differentia	ivergence of sequen l calculus in several	ces and se- variables.
Intend	ed learı	ning outcomes				
The stu mather central	ident ki natical proof r	nows and masters the est arguments and present t nethods and concepts in	sential methods and hem adequately in w analysis, their analy	notions of analysis. rritten and oral form. tic background and s	He/She is able to pe He/She is acquaint geometric interpreta	erform easy ed with the tion.
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
compo	nent. .o-M-AN .o-M-AN .o-M-AN	IA-1-122: V + Ü (no inform IA-2-122: V + Ü (no inform IA-P-122: M (no informati <b>:essment</b> (type, scope, langua	nation on SWS (week nation on SWS (week on on SWS (weekly c ge — if other than German.	ly contact hours) and ly contact hours) and ontact hours) and co examination offered — if no	l course language av d course language av ourse language avail t every semester, informat	vailable) vailable) able)
module is	s creditab	le for bonus)			levery semester, mormat	on on whether
Assess low. Ur vidual	ment ir 1less st assessi	n this module comprises ated otherwise, successf ments.	the assessments in t ful completion of the	he individual module module will require s	e components as sp successful completio	ecified be- on of all indi-
<ul> <li>Assessment in module component 10-M-ANA-1-122: Analysis 1 Analysis 1</li> <li>8 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component was selected as subject of the oral examination 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 at a later date, students will put their registration for admission to assessment anew.</li> <li>Assessment in module component 10-M-ANA-2-122: Analysis 2 Analysis 2</li> <li>8 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment anew.</li> <li>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 anew.</li> <li>Assessment in module component 10-M-ANA-2-122: Analysis 2 Analysis 2</li> <li>8 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 to 180 minutes). Module will also be considered successfully completed if the module component tao-M-ANA-2-122: Analysis 2 Analysis 2</li> </ul>						
• Ľ	anguag	ge of assessment: Germa	n, English if agreed u	pon with the examin	ler	
Bachelor's (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam o ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 8 / 153

Other prerequisites: 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 anew.

Assessment in module component 10-M-ANA-P-122: Examination in Analysis

- 4 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-ANA-1 and 10-M-ANA-2
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of the written examination in any one of the other two module components is a prerequisite for participation in module component 10-M-ANA-P.

#### **Allocation of places**

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Additional information

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Workload

Teaching cycle

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

§ 73 (1) 1. Mathematik Analysis

#### Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

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

Module	e title				Abbreviation
Linear Algebra					10-M-LNA-122-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathema		atics) Institute of Mathematics		atics	
ECTS Method of grading Only a		Only after succ. con	npl. of module(s)		
20	nume	rical grade			
Duration Module level Other prere		Other prerequisites			
2 semester undergraduate By way of exception, additional prerequassessments.		isites are listed in the section on			

#### Contents

Basic notions and structures; vector spaces, linear maps and systems of linear equations; theory of matrices and determinants; eigenvalue theory; bilinear forms and Euclidean/unitary vector spaces; diagonalisability and Jordan normal form.

#### Intended learning outcomes

The student knows and masters the basic notions and essential methods of linear algebra. He/She is able to perform easy mathematical arguments independently, and can present them adequately in written and oral form. He/She is able to apply the central proof methods and concepts of linear algebra and knows about their algebraic and geometric background.

**Courses** (type, number of weekly contact hours, language – if other than German)

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-LNA-P-122: M (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 is creditable for bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

#### Assessment in module component 10-M-LNA-1-122: Linear Algebra 1 Linear Algebra 1

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: 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 anew.

#### Assessment in module component 10-M-LNA-2-122: Linear Algebra 2 Linear Algebra 2

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the

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module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.

- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: 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 anew.

Assessment in module component 10-M-LNA-P-122: Examination in Linear Algebra

- 4 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-LNA-1 and 10-M-LNA-2
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of the written examination in any one of the other two module components is a prerequisite for participation in module component 10-M-LNA-P.

Allocation of places

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Additional information

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Workload

Teaching cycle

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

§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

#### Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

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

Module title				Abbreviation	
Advanced Analysis					10-M-VAN-122-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathema		atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
9	nume	rical grade			
Duratio	on	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 for admission to assessment anow.			
Conten	ts				
Continu	uation	of analysis in several vari	ables, integration the	eorems.	
Intende	ed lear	ning outcomes			
The stu she is a	ident is able to	acquainted with advanc understand the construc	ed topics in analysis. tion of a complex ma	. Taking the example thematical concept.	of the Lesbegue integral, he or
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no info	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>d of ass</b> s creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written if anno each (a Langua	examin unced approx. age of a	nation (approx. 90 to 180 by the lecturer, the writte 20 minutes) or an oral ex ssessment: German, Eng	minutes) n examination can be amination in groups lish if agreed upon w	e replaced by an ora (groups of 2, approx ith the examiner	examination of one candidate a. 30 minutes)
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
Teachi	ng cycl	е			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2012)		
Bachel	or' deg	ree (1 major) Mathematic	S (2013)		
Bachel	or' deg	ree (1 major) Mathematic	al Miysics (2012)	12)	
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20)	13)	

Module title				Abbreviation			
Modelling and Computational Science				10-M-MWR-122-mo	L		
Module coordinator			Module offered by				
Dean o	f Studi	es Mathematik (Mathen	natics)	Institute of Mathem	natics		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)			
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester undergraduate			Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	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 anow.			
Conten	ts						
Aspects scaling ons, fui near ec	s of ma the mo ndame quation	thematical modelling o odelling, asymptotic sen ntal methods for numer s.	f technical or scientific ries, classical methods rical solution of partial	processes. Basic pr for solving ordinary differential equatior	inciples of modelling and partial different ns and the resulting	g, aspects of ial equati- systems of li-	
Intende	ed lear	ning outcomes					
The stu and en	ident m gineeri	nasters the fundamenta ng sciences on a compu	l mathematical method uter.	ds and techniques to	simulate processes	from natural	
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ger	man)			
V + Ü (r	no info	rmation on SWS (weekly	/ contact hours) and co	ourse language avail	able)		
Methoo module is	<b>d of ass</b> creditab	<b>Sessment</b> (type, scope, langule for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether	
written if anno each (a Langua	examin unced upprox. uge of a	nation (approx. 90 to 18 by the lecturer, the writh 20 minutes) or an oral ssessment: German, Er	Bo minutes) ten examination can be examination in groups nglish if agreed upon w	e replaced by an ora (groups of 2, appro) ith the examiner	l examination of one k. 30 minutes)	candidate	
Allocat	ion of J	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	e					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)			
Module	e appea	ars in	turo Tochnology (acco)	N			
Bachel	or deg or deg	ree (1 major) Mathemat	ical Physics (2012)	,			
Bachel	or' deg	ree (1 major) Computati	onal Mathematics (20	12)			
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Bachelor' degree (1 major) Computational Mathematics (2013)

Module title			Abbreviation		
Numerical Mathematics					10-M-NUM-122-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathema		atics) Institute of Mathematics		natics	
ECTS Method of grading Only after succ. co		Only after succ. con	npl. of module(s)		
20	nume	rical grade			
Duration Module level Other prerequisites					
2 semester undergraduate By way of exception, additional prerequassessments.		isites are listed in the section on			

#### Contents

Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration, eigenvalue problems, linear programming, methods for initial value problems for ordinary differential equations, boundary value problems.

#### Intended learning outcomes

The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their advantages and limitations concerning their possibilities for application in natural and engineering sciences and economics.

**Courses** (type, number of weekly contact hours, language – if other than German)

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 10-M-NUM-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-NUM-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-NUM-P-122: M (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 is creditable for bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 10-M-NUM-1-122: Numerical Mathematics 1 Numerical Mathematics 1

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: 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 anew.

Assessment in module component 10-M-NUM-2-122: Numerical Mathematics 2 Numerical Mathematics 2

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the

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module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination was passed.

- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: 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 anew.

Assessment in module component 10-M-NUM-P-122: Examination in Numerical Mathematics

- 4 ECTS, Method of grading: numerical grade
- oral examination of one candidate each (approx. 30 minutes); assessment will have reference to the contents of modules 10-M-NUM-1 and 10-M-NUM-2
- Language of assessment: German, English if agreed upon with the examiner
- Only after successful completion of module components: Successful completion of the written examination in any one of the other two module components is a prerequisite for participation in module component 10-M-NUM-P.

#### Allocation of places

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#### Additional information

Additional information will be listed separately for each module component.

- 10-M-NUM-P-122: --
- 10-M-NUM-1-122: Additional information on module duration: 1 to 2 semesters.
- 10-M-NUM-2-122: Additional information on module duration: 1 to 2 semesters.

#### Workload

#### Teaching cycle

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

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#### Module appears in

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

Module title					Abbreviation	
Advanc	ed Con	nputational Mathematic	S		10-M-VTC-122-m01	
Module coordinator			Module offered by			
Dean o	f Studi	es Mathematik (Mathem	atics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
20	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	By way of exception assessments.	, additional prerequi	sites are listed in th	e section on
Conten	ts					
Two of <b>Stocha</b> tion the sures a ted values a ted values <b>Stocha</b> variate <b>Introdue</b> <b>Introdue</b> tion, sue metrices <b>Ordina</b> itial values higher of <b>Introdue</b> tegrals theorer <b>Geome</b> ke's the <b>Introdue</b> sargues <b>Introdue</b> sargues <b>Introdue</b> sargues <b>Introdue</b> tional a <b>Operat</b> graph t <b>Introdue</b> sation, ry of que <b>Intende</b> The stue theose fue	the foll stics 1 eory, cc and store ue and stics 2 statisti iction t is, main ry Diffe lues, sy order) iction t and Ca m and a tric Ana eorem a iction t s, fund- iction t analysis ions Re heoretii iction t iction t analysis ions Re heoretii iction t iction t analysis ions Re heoretii iction t iction	owing topics in pure or a (Combinatorics, Laplace ontinuous distributions: in chastic independence, e variance, limit theorems (Elements of data analysis (Elements of data analysis (S) o Algebra (Fundamental o Differential Geometry folds in Euclidean space theorem on local surface rential Equations (Exister stems of linear different o Complex Analysis (Cor nuchy integral theorems, applications, Weierstraß alysis (Fundamentals in and applications in vector o Projective Geometry (F amental theorems for pro o Discrete Mathematics cryptographic methods, f o Functional Analysis (B s) esearch (Linear programmeters) o Number Theory (Elementers) o Number Theory (Elementers) acquainted with advance ental mathematical concepts, and realises the advance opts, and realises the advance opta advance opta advance opta advance opta advance opta advance opta advance opta advance opta advance opta advance opta advance opta advance o	applied mathematics: models, selected dis normal distribution, ra lementary conditiona s: law of large number sis, statistics of data i algebraic structures: (Curves in Euclidean s es, hypersurfaces in pa e theory, special class ence and uniqueness ial equations, matrix mplex differentiability isolated singularities product theorem and analysis on manifolds or analysis and topolo Projective spaces, duali (Techniques from con error-correcting codes anach spaces and Hil ming, duality theory, t entary properties of di- ts and methods for fa- prometrics and methods her vantages of thinking a	crete distributions, e andom variable, dist l probability, charact s, central limit theor n normal and other groups, rings, fields spaces, curvature, Fr articular, curvature o ses of surfaces) theorem; continuous exponential series, l and Cauchy-Rieman , meromorphic funct theorem of Mittag-L s, submanifolds, calo gy) lanes, projective and ties and polarities o nbinatorics, introduc bert spaces, bounded ransport problems, i visibility, prime num ctorisation, structure proximation and diop hods of pure and/or s/she is able to persu	elementary measure ribution function, pr teristics of distribution em) distributions, element ; Galois theory) enet equations, locat f hypersurfaces, geo s dependence of solutions inear differential equations inear differential equations in differential equations and Laurent set effler, conformal matculus of differential f d affine spaces, theory efflor to graph theory end operators, princip ntegral linear progrations bers and prime nume e of the residue class ohantine equations).	and integra- oduct mea- ons: expec- nts of multi- al classifica- odesics, iso- utions on in- uations of ons, path in- ries, residue ps) forms, Sto- orem of De- including les of func- imming, ber factori- s rings, theo- cs. Based on d interrela- in mathema-
Courses (type, number of weekly contact hours, language — if other than German)						
<ul> <li>Courses (type, number of weekly contact hours, language – if other than German)</li> <li>This module has 6 components; information on courses listed separately for each component.</li> <li>10-M-STO-1-122, 10-M-DGL-1-122, 10-M-FTH-1-122, 10-M-GAN-1-122, and 10-M-FAN-1-122: V + Ü (no information on language and number of weekly contact hours available)</li> <li>10-M-VTC-P-122: M (no information on language and number of weekly contact hours available)</li> </ul>						
Bachelor's (2012)	with 1 ma	or Computational Mathematics	JMU Würzburg ● ge cord Bachelor (18c	nerated 26-Aug-2024 • exam ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 17 / 153

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

This module has the following 6 assessment components. To pass this module, students must pass two out of the 5 assessment components that are first in the list below and the assessment component that is last in the list below.

Assessment in module component 10-M-STO-1-122: Stochastik 1 (Stochastics 1), in module component 10-M-DGL-1-122: Gewöhnliche Differentialgleichungen (Ordinary Differential Equations), in module component 10-M-FTH-1-122: Einführung in die Funktionentheorie (Introduction to Complex Analysis), in module component 10-M-GAN-1-122: Geometrische Analysis (Geometric Analysis), and in module component 10-M-FAN-1-122: Einführung in die Funktionalanalysis (Introduction to Functional Analysis) :

- 8 ECTS credits, pass / fail
- written examination (approx. 90 to 180 minutes). If announced by the lecturer, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 30 minutes). The module component will also be considered successfully completed if it is selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination is passed.
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. 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 anew.

**Assessment in module component 10-M-VTC-P-122:** Prüfung in Vertiefung Computational Mathematics (Assessment in Advanced Computational Mathematics)

- 4 ECTS credits, numerical grading
- oral examination of one candidate each (approx. 30 minutes). Assessment will have reference to the topics covered in the two module components selected by students.
- Language of assessment: German; English if agreed upon with examiner(s)
- Only after successful completion of module components: Module component 10-M-VTC-P can only be taken by students who passed the written examination in one of the other five module components.

#### Allocation of places

#### Additional information

Additional information on module duration: 1 to 2 semesters.

Workload

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**Teaching cycle** 

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

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#### Module appears in

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

Bachelor's with 1 major Computational Mathematics	I
(2012)	I



### **Compulsory Electives**

(50 ECTS credits)



### **Computational Mathematics**

(ECTS credits)

Module	title				Abbreviation
Mather	natics	in Culture and Society			10-M-MKG-122-m01
Module	coord	inator		Module offered by	
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
8	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	undergraduate	By way of exception assessments.	, additional prerequ	isites are listed in the section on
Conten	ts				
<ul> <li>Intended learning outcomes</li> <li>Based on selected examples, the student has gained insight into the historical and cultural genesis of mathematical relevance. He/she is able to present mathematical ideas and concepts to a general audience.</li> </ul>					
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
<ul> <li>This module has 4 components; information on courses listed separately for each component.</li> <li>10-M-GES-1-122, 10-M-MSC-1-122, and 10-M-SCH-1-122: V + Ü (no information on language and number of weekly contact hours available)</li> <li>10-M-PRO-1-122: S (no information on language and number of weekly contact hours available)</li> </ul>					
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
This module has the following 4 assessment components. To pass the module as a whole students must pass two of the four assessment components.					as a whole students must pass

**Assessment in module component 10-M-GES-1-122:** Ausgewählte Kapitel aus der Geschichte der Mathematik (Selected Topics from the History of Mathematics), **in module component 10-M-MSC-1-122:** Mathematisches Schreiben (Mathematical Writing), and **in module component 10-M-SCH-1-122:** Schulmathematik vom höheren Standpunkt (School Mathematics from a Higher Perspective) :

- 4 ECTS credits, pass / fail
- project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course)
- Assessment will be offered in the semester in which the course is offered and in the subsequent semester.
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. 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 anew.

Assessment in module component 10-M-PRO-1-122: Proseminar Mathematik (Proseminar Mathematics)

- 4 ECTS credits, pass / fail
- talk (approx. 60 to 180 minutes)
- Assessment will be offered in the semester in which the course is offered and in the subsequent semester.
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. 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 stu-

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(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

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dents 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 anew.

#### Allocation of places

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#### Additional information

Additional information on module duration: 1 to 2 semesters.

Workload

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#### Teaching cycle

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

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#### Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

First state examination for the teaching degree Gymnasium Mathematics (2012)

Module title				Abbreviation	
Additional Se	minar in Mathematics			10-M-SE2-122-m01	
Module coord	inator		Module offered by		
Dean of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	atics	
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)		
5 (not)	successfully completed				
Duration	Module level	Other prerequisites			
1 semesterUndergraduateCertain prerequisites must be met to qualify for sessment. The lecturer will inform students abo at the beginning of the course. Registration for sidered a declaration of will to seek admission dents have obtained the qualification for admis the course of the semester, the lecturer will put sessment into effect. Students who meet all pre ted to assessment at a later date, students will have to determine ted to determine ted to determine sessment at a later date, students will have to determine ted to determine		alify for admission to as- nts about the respective details ion for the course will be con- hission 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			
Contents	<u>.</u>	1			
An additional	selected topic in mathen	natics.			
Intended lear	ning outcomes				
The student g of a given top ly in a scientif	ains first experience with ic using selected literatu ic discussion.	independent scientif re, and prepares a tal	fic work. He/She ma k on the subject. He	sters elaboration and structuring /She is able to participate active-	
Courses (type, r	number of weekly contact hours,	anguage — if other than Ger	man)		
S (no informa	tion on SWS (weekly cont	act hours) and cours	e language available	e)	
Method of ass module is creditab	<b>Sessment</b> (type, scope, langua ole for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
talk (approx. Language of a	60 to 180 minutes) ssessment: German, Eng	lish if agreed upon w	ith the examiner		
Allocation of	places				
Additional inf	ormation				
Workload	Workload				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013)					
Bachelor' deg	ree (1 major) Computatio	nal Mathematics (20:	12)		
Bachelor' deg	ree (1 major) Computatio	nal Mathematics (20:	13)		

Module title	Abbreviation				
Selected Topics from Computational Mathematics	10-M-ERC-122-m01				
Module coordinator	Module offered by				
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics				
ECTS Method of grading Only after s	ucc. compl. of module(s)				
10 numerical grade					
Duration Module lovel Other press					
Duration Module level Other prere	quisites				
2 semester undergraduate By way of example assessment	cception, additional prerequisites are listed in the section on ts.				
Contents					
Contents Con					
The student is acquainted with advanced concepts	and methods of pure and/or applied mathematics. Based on				
these fundamental mathematical concepts and methods he/she is able to persue further studies and interrelate these concepts, and he/she knows about interrelations of the acquired knowledge.					
Courses (type, number of weekly contact hours, language — if other than German)					
<ul> <li>Courses (type, number of weekly contact hours, language – if other than German)</li> <li>This module has 13 components; information on courses listed separately for each component.</li> <li>10-M-STO-1-122, 10-M-ALG-1-12, 10-M-DGE-1-122, 10-M-DGL-1-122, 10-M-FTH-1-122, 10-M-GAN-1-122, 10-M-PGE-1-122, 10-M-DIM-1-122, 10-M-FAN-1-122, 10-M-ORS-1-122, 10-M-ZTH-1-122, and 10-M-MMP-2-122: V + Ü (no information on language and number of weekly contact hours available)</li> <li>10-M-ERC-P-122: M (no information on language and number of weekly contact hours available)</li> </ul>					
• 10-M-ERC-P-122: M (no information on langua	of weekly contact hours available) ge and number of weekly contact hours available)				

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

This module has the following 13 assessment components. To pass this module, students must pass one out of the 12 assessment components that are first in the list below and the assessment component that is last in the list below.

Assessment in module component 10-M-STO-1-122: Stochastik 1 (Stochastics 1), in module component 10-M-ALG-1-122: Einführung in die Algebra (Introduction to Algebra) in module component 10-M-DGE-1-122: Einführung in die Differentialgeometrie (Introduction to Differential Geometry), in module component 10-M-DGL-1-122: Gewöhnliche Differentialgelichungen (Ordinary Differential Equations), in module component 10-M-FTH-1-122: Einführung in die Funktionentheorie (Introduction to Complex Analysis), in module component 10-M-GAN-1-122: Geometrische Analysis (Geometric Analysis), in module component 10-M-FTH-1-122: Geometrie (Introduction to Projective Geometry), in module component 10-M-GAN-1-122: Geometrie (Introduction to Projective Geometry), in module component 10-M-FTH-1-122: Einführung in die Projektive Geometrie (Introduction to Discrete Mathematics), in module component 10-M-FAN-1-122: Einführung in die Diskrete Mathematik (Introduction to Functional Analysis), in module component 10-M-GRS-1-122: Derations Research, in module component 10-M-CRS-1-122: Einführung in die Theory), and in module component 10-M-MMP-2-122: Mathematik in der Mathematischen Physik 2 (Mathematics in Mathematical Physics 2) :

- 8 ECTS credits, pass / fail
- written examination (approx. 90 to 180 minutes). If announced by the lecturer, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 30 minutes). The module component will also be considered successfully completed if it is selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prüfungsteilmodul)) and this examination is passed.
- Language of assessment: German; English if agreed upon with examiner(s)
- Additional prerequisites: To qualify for admission to assessment, students must meet certain prerequisites. 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 anew.

**Assessment in module component 10-M-ERC-P-122:** Prüfung in Ergänzung Computational Mathematics (Assessment in Selected Topics from Computational Mathematics)

- 2 ECTS credits, numerical grading
- oral examination of one candidate each (approx. 30 minutes). Assessment will have reference to the topics covered in the module component selected by students.
- Language of assessment: German; English if agreed upon with examiner(s)
- Only after successful completion of module components: Module component 10-M-ERC-P can only be taken by students who passed the written examination in one of the other 12 module components.

#### Allocation of places

#### Additional information

Additional information on module duration: 1 to 2 semesters.

#### Workload

#### Teaching cycle

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

#### Module appears in

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

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2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012



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



### **Application-oriented Subject**

(ECTS credits)

Students must take one of the following application-oriented subjects, each with the specified mandatory courses and/or mandatory electives: Biologie (Biology), Chemie (Chemistry), Informatik (Computer Science), Physik (Physics).



### Application-oriented Subject Biology

(ECTS credits)



### Application-oriented Subject Biology Compulsory Electives 1

(ECTS credits)

Module title					Abbreviation
Genetics, Neurobiology, Behaviour					07-2A2GNV-072-m01
Module	Module coordinator			Module offered by	
Dean of	fStudie	es Biologie (Biology)		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	By way of exception assessments.	, additional prerequi	isites are listed in the section on
Conten	ts				
Fundam	nental	principles of genetics, ne	urobiology and beha	vioural biology.	
Intende	ed learn	ning outcomes			
process bases c cal mec molecu	ses invo of inher chanisn lar and	olved in animal behaviou itance.] [Version 2: Stude ns and processes involve l formal bases of inherita	ir and will be able to ents will understand ed in animal behaviou nce.]	relate animal behavi that there are molec ur and will be able tc	iour to the molecular and formal ular, cellular and system biologi- o relate animal behaviour to the
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
<ul> <li>o7-2A2GNV-1G-072: V + U (no information on SWS (weekly contact hours) and course language available)</li> <li>o7-2A2GNV-2N-072: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>o7-2A2GNV-3V-072: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)</li> <li>Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</li> </ul>					
<ul> <li>Assessment in module component o7-2A2GNV-1G-072: Basic Genetics Basic Genetics</li> <li>2 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 30 minutes)</li> <li>Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.</li> <li>Assessment in module component o7-2A2GNV-2N-072: Basic Neurobiology Basic Neurobiology</li> <li>2 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 30 minutes)</li> <li>Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.</li> <li>Assessment in module component 07-2A2GNV-2N-072: Basic Neurobiology Basic Neurobiology</li> <li>2 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 30 minutes)</li> <li>Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.</li> <li>Assessment in module component 07-2A2GNV-3V-072: Behavioural Biology Behavioural Biology</li> <li>2 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 30 minutes, word problems and/or multiple choice questions)</li> <li>Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.</li> <li>Allocation of places</li> </ul>					
Only as	part of	f "spezielles Studienange	ebot": 10 places		
Additio	nal inf	ormation	10 places.		

Wo	rklo	bad

Teaching cycle

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

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#### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2007) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2008) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2008) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010) No final examination Special study offering (2010)

Mathematical Biology and Biostatistics       opr 2BM-org2-mon         Module circles       Texes       Faculty of Biology         holds       Faculty of Biology       Faculty of Biology         CTS       Method of grading       Only after succ. comp Lof module(3)         A       numerical grade          Duration       Module level       Other prerequisite to assessment; regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.         Conternet       Fundamental principles of the most important mathematical and statistical processes.         Contrest (ypen, number of weekly contact hours, langage – if other than German)       \         V to (no information on SWS (weekly contact hours) including multiple choice questions       \         Motical for pace // spezielles Studienangebot*; 30 places.       \         Additical information (Spezielles Studienangebot*; 30 places.       \         Additical information regulariants for excling-degree programme)       \         Creace // spezielles Studienangebot*; 20 places.       \         Additical information (Specielles Studienangebot	Module title					Abbreviation	
Mode       Mode       Med       Med <t< td=""><td colspan="5">Mathematical Biology and Biostatistics</td><td>07-2BM-072-m01</td></t<>	Mathematical Biology and Biostatistics					07-2BM-072-m01	
holder       rthe Chair of Bioinformatics       faculty of Biology         ECTS       Method of grading       only after succ. compl. of module(s)         4       numerical grade          Duration       Module level       Other prerequisites         1 semister       undergraduate       Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.         Contents         Fundamental principles of the most important mathematical and statistical methods in biology.         Interpretation of the respective exercises as specified at the beginning of the course.         Contents         Fundamental principles of the most important mathematical and statistical methods in biology.         Interpretation of predimental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.         Courses         Courses         Course setsion (nype, scope, language – if other than German, examination offerd – if not every semester, information on whether module is creditable for bonus         Addittonal information regulations for teaching-degree programmes)         Course         Course         Course <td< td=""><td>Module</td><td>e coord</td><td>inator</td><td></td><td>Module offered by</td><td></td></td<>	Module	e coord	inator		Module offered by		
ECTS         Methanism         Only after succ. compl. of module(s)           4         numerical grade            Duration         Module level         Other prerequisites           1 semestri         undergraduate         Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.           Contents         Fundamental principles of the most important mathematical and statistical methods in biology.           Intended learning outcomes         Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.           Courses (yee, number of weekly contact hours, language – if other than German)         V + 0 (no information on SWS (weekly contact hours) and course language available)           Methae is for bonus         written examination (approx. 45 minutes) including multiple choice questions           Allocational information         Spezielles Studienangebot*: 30 places.           Additional information regulation regulations for teaching-degree programmes)	holder	of the (	Chair of Bioinformatics		Faculty of Biology		
4         numerical grade            Duration         Module level         Other preequisites           1 semistrian         undergraduate         Admission preequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.           Contents         Encodemental principles of the most important mathematical and statistical methods in biology.           Intended learning outcomes         Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.           Courses (yope, number of weekly contact hours, language – if other than German)         Courses (yope, number of weekly contact hours) and course language available           Method of assessment (type, scope, language – if other than German)         Courses (yope, number of weekly contact hours) and course language available           Method of places         Course (yope, number of weekly contact hours) and course language available           Moltation of places         Course (yope, number of weekly contact hours) and course language available           Mortical information on SWS (weekly contact hours) and course language available         Method for assessment (type, scope, language – if other than German)           V + () (no information regulations for teaching-degree programmes)         Totact – Tota	ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
Duration         Module level         Other prerequisites           1 semester         undergraduate         Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.           Contents           Fundamental principles of the most important mathematical and statistical methods in biology.           Intended learning outcomes         Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.           Courses (type, number of weekly contact hours, language – if other than Geman)         V + 0 (no information on SWS (weekly contact hours) and course language available)           Method of assessment (type, scope, language – if other than Geman, examination offered – if not every semester, information on whether module is creditable for bonus)           written examination (approx. 45 minutes) including multiple choice questions           Aldiction of Flaces           Contents	4	nume	rical grade				
a semester     undergraduate     Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.       Contents     Fundamental principles of the most important mathematical and statistical methods in biology.       Intended learning outcomes     Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.       Courses (type, number of weekly contact hours, language – if other than German)     V + U (no information on SWS (weekly contact hours) and course language available)       Method of assessment (type, scope, language – if other than German, exemination offered – if not every semester, information on whether module is creditable for bonus)       written examination (approx, 45 minutes) including multiple choice questions       Alditional information	Duratio	n	Module level	Other prerequisites			
Contents         Fundamental principles of the most important mathematical and statistical methods in biology.         Intende learning outcomes         Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.         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 is creditable for bonus)         written examination (approx. 45 minutes) including multiple choice questions         Aldication of places         Only as part of "spezielles Studienangebot": 30 places.         Additional information            Workload            Teaching cycle            Module appears in         Bachelor' degree (1 major) Biochemistry (201)         Bachelor' degree (1 major) Biology (201)         Bachelor' degree (1 major) Bio	1 seme	ster	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: 1 pletion of the respec 1rse.	regular attendance of exercises tive exercises as specified at the	
Fundamental principles of the most important mathematical and statistical methods in biology. Intended learning outcomes Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes. 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 is creditable for bonus) written examination (approx. 45 minutes) including multiple choice questions Allocation of places Additional information Workload Morkload Morkload Morkload Module appears in Bachelor' degree (1 major) Biochemistry (201) Bachelor' degree (1 major) Biology (201) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major) Computational Mathem	Conten	ts					
Intended learning outcomes Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes. 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 is creditable for bonus) written examination (approx. 45 minutes) including multiple choice questions Allocation of places Only as part of "spezielles Studienangebot": 30 places. Additional information	Fundam	nental	principles of the most im	portant mathematica	l and statistical met	hods in biology.	
Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes. <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 semester, information on whether module is creditable for bonus) written examination (approx. 45 minutes) including multiple choice questions <b>Allocation of places</b> Only as part of "spezielles Studienangebot": 30 places. <b>Additional information</b>  <b>Workload</b>  <b>Teaching cycle</b>  <b>Referred to in LPO 1</b> (examination for teaching-degree programmes)  <b>Module appears in</b> Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2012) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2012) Bachelor' degree (1 major) Biology (2013) Bachelor' degree (1 major) Biology (2014) Bachelor' degree (1 major) Biology (2015) Bachelor' degree (1 major) Biology (2016) Bachelor' degree (1 major) Biology (2017) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010	Intende	ed lear	ning outcomes				
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 is creditable for bonus)         written examination (approx. 45 minutes) including multiple choice questions         Allocation of places         Only as part of "spezielles Studienangebot": 30 places.         Additional information            Workload            Teaching cycle            Referred to in LPO1 (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2012)         Bachelor' degree (1 major) Biology (2013)         Bachelor' degree (1 major) Biology (2014)         Bachelor' degree (1 major) Biology (2015)         Bachelor' degree (1 major) Biology (2017)         Bachelor' degree (1 major	Studen and nu	ts will mbers	have acquired fundamen as well as the mathemati	tal skills in the evalua cal description of bio	ation of experiments logical processes.	, the interpretation of readings	
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 is creditable for bonus)  written examination (approx. 45 minutes) including multiple choice questions Allocation of places Only as part of "spezielles Studienangebot": 30 places. Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Bachelor' degree (1 major) Biochemistry (201) Bachelor' degree (1 major) Biology (201) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008) Bachelor's degree (1 major, 1 minor) Biology (Minor	Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 45 minutes) including multiple choice questions Allocation of places Only as part of "spezielles Studienangebot": 30 places. Additional information	V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)	
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Allocation of places Only as part of "spezielles Studienangebot": 30 places. Additional information 	written	exami	nation (approx. 45 minute	es) including multiple	choice questions		
Only as part of "spezielles Studienangebot": 30 places.  Additional information   Workload   Teaching cycle   Referred to in LPO I (examination regulations for teaching-degree programmes)   Module appears in Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2012) Bachelor' degree (1 major) Biology (2012) Bachelor' degree (1 major) Biology (2013) Bachelor' degree (1 major) Biology (2014) Bachelor' degree (1 major) Biology (2015) Bachelor' degree (1 major) Biology (2015) Bachelor' degree (1 major) Biology (2016) Bachelor' degree (1 major) Biology (2017) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major) Attematics (2013) Bachelor's degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major) Attematics (2014	Allocat	ion of p	olaces				
Additional information Workload Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2008) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010) No final examination Special study offering (2010)	Only as	part o	f "spezielles Studienange	ebot": 30 places.			
Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biochemistry (2009)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2010)         Bachelor' degree (1 major) Biology (2010)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Omputational Mathematics (2012)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)         No final examination Special study offering (2010)	Additio	nal inf	ormation				
Workload            Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biochemistry (2009)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Mathematics (2013)         Bachelor' degree (1 major) Computational Mathematics (2012)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)         No final examination Special study offering (2010)							
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Teaching cycle            Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biochemistry (2009)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2010)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Mathematics (2013)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)         No final examination Special study offering (2010)							
Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biochemistry (2009)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2010)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Mathematics (2013)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)         No final examination Special study offering (2010)	Teachir	ıg cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)            Module appears in         Bachelor' degree (1 major) Biochemistry (2011)         Bachelor' degree (1 major) Biochemistry (2009)         Bachelor' degree (1 major) Biology (2011)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2007)         Bachelor' degree (1 major) Biology (2010)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Mathematics (2012)         Bachelor' degree (1 major) Computational Mathematics (2012)         Bachelor' degree (1 major) Computational Mathematics (2013)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)         Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)         No final examination Special study offering (2010)							
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No final examination Special study offering (2010)	Bachel	or's de	gree (1 major, 1 minor) Bi	ology (Minor, 2008)			
	No fina	l exam	ination Special study offe	ering (2010)			

Module title					Abbreviation
Basic P	hysiol	ogy of Animals for minor	field of study		07-2A2TP-NF-082-m01
Module	e coord	inator		Module offered by	
Dean of	f Studi	es Biologie (Biology)		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: pletion of the respec Irse.	regular attendance of exercises ctive exercises as specified at the
Conten	ts				
This mo vide the module	odule w em witl e will di	vill acquaint students wit n an opportunity to devel scuss the physiological p	h the principles of ge op the fundamental s processes that regula	neral and comparati kills for working in a te the internal envir	ive plant physiology and will pro- a physiological laboratory. The onment of animals.
Intende	ed lear	ning outcomes			
Studen ve acqu	ts have uired fu	e developed an understar Indamental knowledge of	nding of the physiolog n planning, setup, int	gical functions and r erpretation and pres	egulation of organisms. They ha- sentation of scientific results.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	<b>d of ass</b> creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
written	exami	nation (approx. 60 minut	es, word problems ar	d/or multiple choic	e questions)
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Mathematics (2012)					
Bachelor' degree (1 major) Mathematics (2013)					
Bachelor' degree (1 major) Computational Mathematics (2012)					
Bachel	or deg	ree (1 major) Computatio	nai Mathematics (201	13)	
Bachel	or's de	gree (1 major, 1 minor) Bi	ology (Minor, 2008)		

Module title					Abbreviation
Basic Physiology of Prokaryotes for minor field of study					07-2A2PPR-NF-082-m01
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Biologie (Biology)	_	Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
3	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
This mo bolic di	odule w iversity	vill acquaint students wit	h the principles of pr	okaryotic physiology	. It will discuss prokaryotic meta-
Intende	ed lear	ning outcomes			
Studen ve acqu	its have uired fu	e developed an understar Indamental knowledge of	nding of the physiolo n planning, setup, int	gical functions and r erpretation and pres	egulation of organisms. They ha- sentation of scientific results.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V + Ü (r	no infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>d of ass</b> creditab	<b>Sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written	exami	nation (approx. 60 minut	es) including multiple	e choice questions	
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)					

Module title					Abbreviation
Basic P	hysiol	ogy of Plants for minor fi	eld of study		07-2A2PPF-NF-082-m01
Module	coord	inator		Module offered by	
Dean of	fStudi	es Biologie (Biology)		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: pletion of the respective.	regular attendance of exercises ctive exercises as specified at the
Conten	ts				
This mo vide the module	odule w em with e will di	vill acquaint students wit n an opportunity to devel scuss the physiological p	h the principles of ge op the fundamental s processes that regula	neral and comparati skills for working in a te the internal envire	ive plant physiology and will pro- a physiological laboratory. The onment of plants.
Intende	ed leari	ning outcomes			
Studen ve acqu	ts have iired fu	e developed an understar ndamental knowledge of	nding of the physiolog n planning, setup, int	gical functions and r erpretation and pres	egulation of organisms. They ha- sentation of scientific results.
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>l of ass</b> creditab	<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
written	examiı	nation (approx. 45 minute	es)		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Mathematics (2012)					
Bachelor' degree (1 major) Mathematics (2013)					
Bachel	Bachelor' degree (1 major) Computational Mathematics (2012)				
Bachel	or deg or deg	ree (1 major) Computatio	nai Mathematics (201 ology (Minor, 2008)	13)	
Bachelo	or's de	gree (1 major, 1 minor) Bi	ology (Minor, 2010)		

Plant and Animal Ecology       07-3A30E-102-m01         Module coordinator       Module offered by         Dean of Studies Biologie (Biology)       Faculty of Biology         ECTS       Method of grading       Only after succ. comp.L. of module(S)         Contents       Module level       Other prerequisites         1 semester       undergraduate       By way of exception, additional prerequisites are listed in the section on assessments.         Contents       This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as a not estimatics of oppulations and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental model concepts of ecology, will become familiar with examples of research in the field of ecology and with the most immental knowledge necessary to develop an understanding of current ecological problems.         Students are familiar with the fundamental principles of research in the field of ecology and with the most immental insues.         Courses (pen, number of weekly contact hours, language — if other than German         This module comprises 2 module components. Information on courses will be listed separately for each module component.         0 07-3A30E-1102: V + Ü (no information on SWS (weekly contact hours) and course language available)         0 07-3A30E-2-102: V + Ü (no information on SWS (weekly contact hours) a	Module title Abbreviation					Abbreviation
Module coordinator         Module offered by           Dean of Studies Biologie (Biology)         Faculty of Biology           ECTS         Method of grading         Only after succ. compl. of module(s)           6         numerical grade            Duration         Module level         Other prerequisites           1 semester         undergraduate         By way of exception, additional prerequisites are listed in the section on assessments.           Contents         This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module mill focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental howeldge necessary to develop an understanding of current ecological problems.           Intended learning outcomes         Students are familiar with the fundamental principles of research in the field of ecology and with the most important abiotic factors that influence the distribution and frequency of occurrece of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environmental issues.           Courses (spen, number of weekly contact hours, language available)         Or >3A30E-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)           Mothod of assessment (type, scope, language - if other than German)	Plant a	Plant and Animal Ecology				07-3A30E-102-m01
Dean of Studies Biologie (Biology)         Faculty of Biology           ECTS         Method of grading         Only after succ. compl. of module(s)           6         numerical grade            Duration         Module level         Other prerequisites           1 semester         undergraduate         By way of exception, additional prerequisites are listed in the section on assessments.           Contents         This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental knowledge necessary to develop an understanding of current ecological problems.           Intended learning outcomes         Students are familiar with the fundamental principles of research in the field of ecology and with the most important abiotic and biotic factors that influence the distribution and frequency of occurrence of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environmental issues.           Courses (type, number of weekly contact hours) and course language available)         • 07 -3A30E -1-102: 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 WS (weekly contact h	Module	coord	inator		Module offered by	
ECTS       Method of grading       Only after succ. compl. of module(s)         6       num=rical grade          Duration       Module level       Other prerequisites         1 semester       undergraduate       By way of exception, additional prerequisites are listed in the section on assessments.         Contents         This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental model concepts of ecology and with the most important abiotic factors that influence the distribution and frequency of occurrence of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environment issues.         Courses (yee, number of weekly contact hours, language – if other than German)         This module comprises 2 module components. Information on courses will be listed separately for each module component.         Ourse (yee, number of weekly contact hours, language – if other than German)         This module comprises 2 module components. Information on SWS (weekly contact hours) and course language available)         or -3A3OE-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)	Dean of	f Studie	es Biologie (Biology)		Faculty of Biology	
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Duration         Module level         Other prerequisites           1 semester         undergraduate         By way of exception, additional prerequisites are listed in the section on assessments.           Contents	6	nume	rical grade			
1 semester       undergraduate       By way of exception, additional prerequisites are listed in the section on assessments.         Contents <ul> <li>Contents</li> <li>Contents</li> <li>By way of exception, additional prerequisites are listed in the section on assessments.</li> <li>Contents</li> <li>Contents</li> <li>This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental knowledge necessary to develop an understanding of current ecological problems.</li> <li>Intende learning outcomes</li> <li>Students are familiar with the fundamental principles of research in the field of ecology and with the most important abiotic and biotic factors that influence the distribution and frequency of occurrence of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environmental issues.</li> <li>Courses (type, number of weekly contact hours, language – if other than German)</li> <li>This module comprises 2 module components. Information on courses will be listed separately for each module component.</li> <li>Ory-3A3OE-1:102: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>Ory-3A3OE-2:102: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>Ory-3A3OE-2:102: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>Ory-3A3OE-2:102: V + Ü (no information on SWS (weekly contact hours) and</li></ul>	Duratio	n	Module level	Other prerequisites		
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Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)         Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.         Assessment in module component o7-3A3OE-1-102: Animal Ecology Animal Ecology         • 3 ECTS, Method of grading: numerical grade         • written examination (approx. 45 minutes)         • Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.         Assessment in module component 07-3A3OE-2-102: Plant Ecology Plant Ecology         • 3 ECTS, Method of grading: numerical grade         • written examination (approx. 45 minutes)         • Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.         Allocation of places         Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.         Additional information         •         •         •         •         •         •         •         •         •	This mo compor o o	odule c nent. 7-3A3C 7-3A3C	omprises 2 module comp )E-1-102: V + Ü (no inform )E-2-102: V + Ü (no inform	oonents. Information ation on SWS (weekl nation on SWS (week	on courses will be li y contact hours) and ly contact hours) and	sted separately for each module l course language available) d course language available)
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Additional information Workload	Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.					
	Additio	Additional information				
Workload						
	Worklo	ad				

Bachelor's with 1 major Computational Mathema	tics
(2012)	
### **Teaching cycle**

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011)

Bachelor' degree (1 major) Biology (2010)

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

No final examination Special study offering (2010)

Module	e title				Abbreviation
Genes,	Molec	ules, Technologies			07-3A3GMT-102-m01
Module	e coord	linator		Module offered by	
Dean o	of Studi	es Biologie (Biology)		Faculty of Biology	
ECTS	Meth	od of grading Only after succ. cor		npl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ıts				
			tile (Cransial Comption)	will build on <i>Finfüh</i>	unun a in die Canatili (Intua duation

The module component *Spezielle Genetik (Special Genetics*) will build on *Einführung in die Genetik (Introduction* to Genetics) and will deepen the students' knowledge of topics from the following areas: structure and evolution of the eukaryotic genome, regulatory RNA, epigenetically and evolutionarily significant genetic mechanisms. The section will also focus on methods of gene expression profiling, reverse genetics and modern methods of gene function and gene sequence analysis. In the module component Einführung in die Bioinformatik (Introduction to Bioinformatics), students will acquire an overview of major areas in the field of bioinformatics: protein sequence and protein domain analysis, phylogeny and evolution of sequences, protein structure, RNA/DNA sequences and structures, cellular networks (regulation, metabolism) and systems biology. In the module component Einführung in die Biotechnologie (Introduction to Biotechnology), students will acquire an overview of the following topics: history of biotechnology, DNA and RNA technologies, recombinant antibodies, molecular diagnostics, nanobiotechnology, biomaterials, bioprocess engineering, microbial biotechnology, transgenic animals and plants, microfluidics. The module component Einführung in die Pharmakokinetik (Introduction to Pharmacokinetics) will provide students with an overview of the rational development of drugs and active agents. The module component will discuss an important aspect for biologists in more detail: the optimisation of the pharmacokinetics of small molecules and proteins. Pharmacokinetics describes the uptake, distribution, metabolism and elimination of a drug or xenobiotic in an organism.

### Intended learning outcomes

Module component *Spezielle Genetik* (*Special Genetics*): Advanced knowledge on genome evolution and the regulation of gene expression. Essential knowledge on current methods in genetics. Module component *Einführung in die Biotechnologie* (*Introduction to Biotechnology*): Students will acquire an overview of both traditional and modern methods in biotechnology and will become familiar with fundamental topics in biotechnology. Module component *Einführung in die Biotechnologie* (*Introduction to Biotechnology*): Students will acquire an overview of both traditional and modern methods in biotechnology and will become familiar with fundamental topics in biotechnology. Module component *Einführung in die Pharmakokinetik* (*Introduction to Pharmacokinetics*): Students will acquire an overview of the fundamental principles of the development and review of active agents in research, clinical practice and the pharmaceutical industry. Optimisation of active agents with regard to absorption, distribution, metabolism and elimination takes place during the early stages of active agent development. The course will equip students with fundamental knowledge that will enable them to predict, on the basis of the structure and physicochemical properties of a small molecule or protein, whether the molecule or protein is suitable as an active agent as well as to predict the fate of the respective active agent in an organism.

Courses (type, number of weekly contact hours, language - if other than German)

This module has 4 components; information on courses listed separately for each component.

• 07-3A3GMT-1-102, 07-3A3GMT-2-102, 07-3A3GMT-3-102, and 07-3A3GMT-4-102: V (no information on language and number of weekly contact hours available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

This module has the following 4 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole.

Assessment in module component o7-3A3GMT-1-102: Genetik (Genetics), in module component o7-3A3GM-T-2-102: Bioinformatik (Bioinformatics), in module component o7-3A3GMT-3-102: Biotechnologie (Biotechnology), and in module component o7-3A3GMT-4-102: Pharmakokinetik (Pharmacokinetics) :

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 38 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

• 1.5 ECTS credits, numerical grading

• written examination (approx. 30 minutes, including multiple choice questions)

# Allocation of places

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# Additional information

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Workload

# Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011)

Bachelor' degree (1 major) Biology (2010)

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Modul	e title				Abbreviation	
From C	ells to	Organisms for minor fiel	ld of study		07-1A1ZO-NF-102-m	101
Module coordinator Module offered by						
Dean of Studies Biologie (Biology)			Faculty of Biology			
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	By way of exception assessments.	, additional prerequ	isites are listed in th	e section on
Conter	nts					
cal cat ting wi ference plants) and hy thods. to the will acc organi- tents c	egories th its m es and s pothes Using t phyloge quire th sms, wi of the m	Building on this knowle acroscopic structure bef similarities between prol econd part will address of es will be discussed and he examples of plants a enetic diversity of eukary e fundamental knowled th morphology and cytol odule are relevant for bio	edge, the course will t fore moving on to its n karyotic cells (bacteria one of the central issu I students will be intro nd animals, the subse rotes. At the level of gr ge necessary to under logy being discussed i ological disciplines at	hen discuss the cell nicroscopic structure a, archaebacteria) ar es of biology: evolut oduced to major phy equent module comp roups in the plant ar stand the forms and in an evolutionary ar all levels of biologic	, the smallest unit of e. The course will po nd eukaryotic cells (a tion. Fundamental m logenetic reconstruc conents will introduc ad animal kingdoms, functions of animal nd ecological contex cal organisation.	r life, star- int out dif- animals, techanisms tion me- ce students students and plant t. The con-
Intend	ed learı	ning outcomes	_			
ledge o mal an liarity v hing ch se plar nents a	of the sp d plant with the naracter nt and a and fun	pecific characteristics of cells Ability to recognic concepts of phylogenet ristics and major represe nimal organisms that ar ctioning of microscopes	the intracellular and one of the intracellular and one of the second sec	extracellular structur iving force behind the een plants/animals. the plant and anima rticular scientific iss	res of prokaryotes as he phylogeny of spe - Familiarity with the Il kingdoms Ability sues Familiarity wit	s well as ani- cies Fami- e distinguis- to select tho- th the compo-
Course	<b>es</b> (type, n	umber of weekly contact hours,	language — if other than Ger	man)		
This m	odule h 07-1A1Z of week 07-1A1Z <b>d of ass</b>	as 4 components; inforr 0-3P-072, 07-1A1ZO-4T-c ly contact hours availabl 0-NF-1Z-082: V (no inform cessment (type, scope, langua	nation on courses list 072, and 07-1A1ZO-2E- le) mation on language a age – if other than German. 6	ed separately for ea 102: V + Ü (no inform nd number of weekl examination offered — if no	ch component. ation on language ar y contact hours avai at every semester, informat	nd number lable)
module i	s creditab	le for bonus)	-3,-		,	
This m these a	odule h assessn	as the following 4 asses nent components to pas	sment components. L s the module as a who	Inless stated otherw ple.	vise, students must p	bass all of
Assess • 2 • 4 • 4 • 4 • 4 • 4 • 4 • 4 • 4	sment in 4 ECTS of written of Additior as succes sment in 4 ECTS of written of Additior n exerc of the co	<b>n module component o7</b> credits, numerical gradin examination (approx. 60 hal prerequisites: admiss essful completion of the <b>n module component o7</b> credits, numerical gradin examination (approx. 60 hal prerequisites: admiss ises as well as successf burse.	-1A1ZO-3P-072: Das P og minutes) sion prerequisite to as respective exercises. -1A1ZO-4T-072: Das Ti g minutes) sion prerequisite to as ful completion of the p	flanzenreich (The Plassessment: regular a erreich (The Animal sessment: regular a respective exercises	ant Kingdom) attendance of exercis Kingdom) ttendance of and pa as specified at the	ses as well rticipation beginning
Bachelor's (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg ● ge cord Bachelor (18c	nerated 26-Aug-2024 • exan ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 40 / 153

**Assessment in module component o7-1A1ZO-NF-1Z-082:** Die Zelle für das Nebenfach Biologie (The Cell for Biology Minors)

• 1 ECTS credit, numerical grading

• written examination (approx. 60 minutes) including multiple choice questions

- Assessment in module component 07-1A1ZO-2E-102: Evolution
  - 1 ECTS credit, pass / fail
  - written examination (approx. 30 minutes, including multiple choice questions)
  - Additional prerequisites: admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.

### **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)

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### Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title	Abbreviation				
Developmental Biology of Animals 07-3A3EBIOT-102-m01					
Module coordinator	Module offered by				
Dean of Studies Biologie (Biology)	Faculty of Biology				
ECTS Method of grading Only a	c. compl. of module(s)				
4 numerical grade					
Duration Module level Other	isites				
1 semester undergraduate Admis and s begin	requisite to assessment: regular attendance of exercises l completion of the respective exercises as specified at the he course.				
Contents					
In this module, students will acquire theoretic biology. The following topics will be covered: bians, nematodes, Drosophila, mouse) and re of spermatozoa and ova), differential gene ex organogenesis, pattern formation, carcinoger insects), eco-devo, evo-devo.	practical background knowledge on animal developmental bryonic development of various model organisms (amphi- for the systematics of animals, gametogenesis (production , cell growth and molecular regulation of cell development, em cell research and cloning, metamorphosis (amphibians,				
Intended learning outcomes					
<ol> <li>Fundamental concepts in developmental bi model organisms (pattern formation). 3. Mole disciplinary connections between developma don, cancer and stem cells as well as gamete 7. Physiological aspects of the developmenta <b>Courses</b> (type, number of weekly contact hours, language V + Ü (no information on SWS (weekly contact <b>Method of assessment</b> (type, scope, language – if o module is creditable for bonus)</li> </ol>	Embryonic and postembryonic development of selected echanisms as well as control of cell development. 4. Inter- and other branches of biology. 5. Cell biology of cotyle- rrelations between ontogeny and evolution/environment. ses discussed. han German) and course language available) erman, examination offered — if not every semester, information on whether				
written examination (approx. 30 to 60 minute	ing multiple choice questions				
Allocation of places					
Additional information					
Workload					
Teaching cycle					
<b>Referred to in LPO I</b> (examination regulations for teac	a programmes)				
Module appears in					
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Biomedicine (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)					

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(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

Module	title				Abbreviation	
Developmental Biology of Plants for minor field of study         07-3A3EBIOP-102-m01					07-3A3EBIOP-102-m01	
Module coordinator Module offered by						
Dean of	fStudie	es Biologie (Biology)		Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme:	ster	undergraduate	Admission prerequis and successful com beginning of the cou	Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.		
Conten	ts					
In this r over a p nation a	module plant's and reg	e, students will acquire an entire life cycle from gerr gulation of different deve	n insight into the fund nination to reproduct lopmental biological	lamental processes ion. The module wil processes in plants	of plant developmental biology l discuss the molecular determi- as well as their plasticity.	
Intende	ed leari	ning outcomes				
1. Fund Selecte embryo ontoge	amenta d mole onic axe ny and	al concepts in developme cular mechanisms that ro es. 5. Examples of mecha evolution. 7. Physiologic	ental biology. 2. Deve egulate determination nisms of morphogen al aspects of the deve	lopmental biology o n and differentiation esis and organogene elopmental processe	f selected model organisms. 3. processes. 4. Establishment of esis. 6. Interrelations between es discussed.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Methoo module is	<b>d of ass</b> creditab	e <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
written	examiı	nation (approx. 30 to 60 i	minutes) including m	ultiple choice quest	ions	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ıg cycl	e				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	rs in				
Bachel	or' deg	ree (1 major) Mathematic	s (2012)			
Bachel	or' deg	ree (1 major) Mathematic	s (2013)			
Bachel	or' deg or' doc	ree (1 major) Computation	nal Mathematics (201	12)		
Bachel	or deg	gree (1 major) Computation	ology (Minor, 2010)	13)		
Duchen						



# Application-oriented Subject Biology Compulsory Electives 2

(ECTS credits)

When taking up their studies, students are highly recommended to consult with the course advisory service Biology that will help them choose appropriate modules from the list below. Modules from the areas "Spezielle Biowissenschaften I / II" ("Specific Biosciences I / II") may only be used by students who achieved no less than 32 ECTS credits in the area of mandatory electives 1 beforehand.

Module	title				Abbreviation
Functional Morphology of arthropods     07-4S1NVC			07-4S1NVO3-092-m01		
Module coordinator Module offered by					
holder	of the (	Chair of Zoology III		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: r pletion of the respec ırse.	regular attendance of exercises tive exercises as specified at the
Conten	ts				
Morpho	ology, a	natomy, phylogeny and e	ecology of arthropods	5.	
Intende	ed learı	ning outcomes			
Studen arthrop	ts are a ods to	ble to explain arthropod ecosystems.	radiations in a functi	onal context as well	as to explain the importance of
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)
Method	l of ass	sessment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
term pa	iper (ap	oprox. 5 to 10 pages)			
Allocati	ion of p	olaces			
Numbe allocate logy) wi ces will 5% of p ject Bio themati ject Bio ble in o the othe places, courses dure, ap tive mo they be plicants of ECTS all mod themati firstly, a and, se position cording qualitat followir compor ces will among	r of pla ed as fo ith 180 be allo laces ( logie () ics and logy (a ne quot there v s of a m pplicar dule w come a s' previ credit: ule con ik (Mat accordi condly n in a t t to this tive rar ng quot nents o be allo applica	ces: 20. Should the num pollows: Places will primar ECTS credits. Should the poated to students of the a minimum of one partici Biology) with 60 ECTS cre Mathematik (Mathemati s well as potentially to st ta exceed the number of a. Should there be, withi will be a uniform regulation odule component that an its who already have succe in the given preferential c available. Selection proce ous academic achievement is they have achieved and mponents in the subject of hematics)) at the time of ng to their average grade a coording to their total of hird ranking will be calcu third ranking. Among ap poking or otherwise by lot. cas: Quota 1 (50% of plac f the Faculty of Biology; a poated by lot. Quota 2 (25 ants with the same numb	ber of applications ex- ily be allocated to stu- module be used in or Bachelor's degree su- pant in total) will be dits and to students ics), each with 180 EC udents of other 'impo- applications, the ren n one module compo- on for the courses of re concerned will be a cessfully completed a onsideration. A waiting ess group 1 (95%): Pla- ents. For this purpose their average grade of Biologie (Biology) ( application. This will weighted according number of ECTS credi lated as the sum of the plicants with the sam Selection process gro es): total number of E among applicants with 5% of places): number er of subject semested	kceed the number of adents of the Bachele other subjects, there abject Biologie (Biolo allocated to student of the Bachelor's de CTS credits, as part of porting' subjects). Sho naining places will be one module compone allocated in a standa at least one other mo- ng list will be mainta aces will primarily be applicants will be ro of all assessments to fexcluding Chemie (C be done as follows: to the number of EC ts achieved (quantit nese two rankings, a ne ranking, places w ECTS credits already h the same number of ers, places will be all ers, places will be all	available places, places will be or's degree subject Biologie (Bio- will be two quotas: 95% of pla- ogy) with 180 ECTS credits and s of the Bachelor's degree sub- gree subjects Computational Ma- f the application-oriented sub- ould the number of places availa- e allocated to applicants from es with a restricted number of nent. In this case, places on all ardised procedure. In this proce- odule component of the respec- ined and places re-allocated as e allocated according to the ap- ranked according to the number aken during their studies or of Chemistry), Physik (Physics), Ma- First, applicants will be ranked, TS credits (qualitative ranking) ative ranking). The applicants' nd places will be allocated ac- ill be allocated according to the <i>i</i> ill be allocated according to the achieved in modules/module of ECTS credits achieved, pla- ers of the respective applicant; located by lot. Quota 3 (25% of

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places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

# Additional information

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Workload

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# Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2008)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module	e title				Abbreviation
Principles of Biochemistry 07-3A3BC-10					07-3A3BC-102-m01
Module coordinator Module offered by					
holder	of the (	Chair of Plant Physiology	and Biophysics	Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequine and successful com beginning of the cou	site to assessment: ı pletion of the respec ırse.	regular attendance of exercises tive exercises as specified at the
Conten	ts				
With th dents v will bed translat formed (PCR, D	e modi vith dec come fa tion) ar on sel NA anc	ale component <i>Makromo</i> eper insights into the mo amiliar with fundamental nd the biochemistry of ca ected topics that were dis d protein gel electrophore	<i>leküle (Macromolecu</i> lecular biology and b principles of molecu rbohydrates, lipids, p scussed in the lecture esis, blot, enzyme kin	<i>les</i> ) as a starting poi iochemistry of proka lar biology (replicatio proteins and nucleic e. The exercise will c letics and detection,	nt, the lecture will provide stu- aryotes and eukaryotes. Students on, transcription, splicing and acids. Experiments will be per- over practical aspects of lab work protein isolation).
Intende	ed lear	ning outcomes			
Studen	ts are f	amiliar with the fundame	ental principles of bio	chemistry.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	<b>d of ass</b> creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written	exami	nation (approx. 30 to 60 i	minutes) including m	ultiple choice quest	ions
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major 1 minor) Biology (Minor 2010)					
Bachel					

Module	e title				Abbreviation
The Flo	ra of Ge	ermany			07-4A4FL-102-m01
Module coordinator Module offered by					
holder o gy	of the C	hair of Ecophysiology ar	nd Vegetation Ecolo-	Faculty of Biology	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)	
7	numer	ical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	By way of exception assessments.	, additional prerequi	isites are listed in the section on
Conten	ts				
will acq gical ar will der using d racteris to typic commo cies-sp site. Ha cussed door fa <b>Intende</b> Studen flowerin up scie	juire an ind econ monstra lichotor stics and al habi on as we ecific cl abitat ec . The m cilities ed learn ts have ng plan ntific ho	overview of the major floor omic importance. Using the how dichotomous key nous keys. Identifying pl d will become familiar wit tats in the Botanical Gard ell as scientific names of haracteristics of these pl cological, geobotanical, odule will also include s and greenhouses to help <b>ing outcomes</b> acquired knowledge and ts. They are familiar with erbaria.	owering plants to be the field guide <i>Flora</i> <i>y</i> s are used, and stud ants, students will le ith the respective terr den and the vicinity of the plants found and ants. Students will p climatic as well as co essions at the Botanio o students acquire sp d skills related to the the terminology of p	found in the tempera von Deutschland by lents will practise ide arn how to identify n minology. The modul of Würzburg. Student d will be introduced t ractise using field gu nservation-relevant ical Garden of the Ur ecies identification s ecology, systematic lant morphology and	ate zone as well as their ecolo- Schmeil-Fitschen, the course entifying freshly-gathered plants najor morphological plant cha- le will also include field trips as will become familiar with the to the family- as well as spe- uides and identification keys on characteristics will also be dis- niversity of Würzburg with its out- skills.
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
This mo compor • o • o	odule co nent. 97-4A4Fl 97-4A4Fl	omprises 2 module comp L-1-102: V + Ü (no inform L-2-102: E (no informatio	oonents. Information ation on SWS (weekly n on SWS (weekly co	on courses will be li y contact hours) and ntact hours) and cou	sted separately for each module course language available) ırse language available)
Methoo module is	<b>d of ass</b> creditabl	<b>essment</b> (type, scope, langua e for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether
Assessi low. Un vidual a	ment in Iless sta assessr	this module comprises ated otherwise, successf nents.	the assessments in t ful completion of the	he individual module module will require s	e components as specified be- successful completion of all indi-
Assess of Germ	ment in hany ECTS, I vritten e veighted sssessm Other pr essful c harium) ment in ECTS, I og (app sssessm	Method of grading: nume examination (approx. 45 d 1:1 nent offered: once a year erequisites: Admission completion of the respect as specified at the begin <b>module component o7</b> - Method of grading: (not) rox. 1 to 2 pages per field nent offered: once a year	<b>4A4FL-1-102:</b> Introduce minutes) and practic , summer semester prerequisite to asses tive exercises (particu- ning of the course. <b>4A4FL-2-102:</b> Field Ex- successfully completed trip) , summer semester	ction to the Flora of ( al identification assi ssment: regular atte ular emphasis to be p ccursions on the Flor ted	Germany Introduction to the Flora ignment (approx. 45 minutes), ndance of exercises and suc- placed on the setting up a her- a of Germany

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(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	



### Allocation of places

Number of places: 180. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

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Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Geography (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title					Abbreviation	
The Fauna of Germany				07-4A4FA-102-m01		
Module coordinator				Module offered by		
holder of the Chair of Animal Ecology and			nd Tropical Biology	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
7	nume	rical grade		•		
Durati	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	By way of exception assessments.	, additional prerequi	isites are listed in th	e section on
Contents						
In this They w cordin will be provid tifving	module vill acqu g of bio taxon-s e stude living s	e, students will acquire a lire a fundamental knowl diversity and will practise specific and will represer nts with an opportunity t pecimens including their	n overview of selecte edge of the systemat e identifying species, at specific habitats or o consolidate the kno r ecology and behavio	d groups of animals ics and taxonomy as using specimens of lifestyles. Field exer owledge and skills th oural biology.	to be found in Centra well as on the quan animals. Selection of cises in a variety of ney acquired in the la	al Europe. titative re- of specimens habitats will ab by iden-
Intend	od loar	ning outcomes				
Studen verteb their fa the bio tors ar	nts know rates) a aunas a ology ar nd are o	w how to taxonomically c nd use identification key nd phenology. On the ba Id ecology of these speci f conservation concern.	lassify selected repress. They are familiar w sis of the morpholog es as well as, where a	esentatives of the inc vith selected Central y and habitats of spe applicable, to predic	digenous fauna (vert European habitats a ecies, students are a t whether they funct	ebrates, in- s well as ble to predict ion as indica-
Course	<b>es</b> (type, r	number of weekly contact hours, I	anguage — if other than Gei	rman)		
Compo • 0 • 0 • 0 • 0 • 0 • 0 • 0 • 0	onent. 07-4A4F 07-4A4F <b>d of ass</b> is creditab	A-1-102: V + Ü (no inform A-2-102: E (no informatic sessment (type, scope, langua le for bonus) n this module comprises	ation on SWS (weekl on on SWS (weekly co ge — if other than German, the assessments in t	y contact hours) and ontact hours) and cou examination offered — if no he individual module	course language av urse language availa tevery semester, informati e components as sp	ailable) ble) on on whether ecified be-
<ul> <li>low. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</li> <li>Assessment in module component o7-4A4FA-1-102: Introduction to the Fauna of Germany Introduction to the Fauna of Germany <ul> <li>4 ECTS, Method of grading: numerical grade</li> <li>written examination (approx. 45 minutes) and practical identification assignment (approx. 45 minutes), weighted 1:1</li> </ul> </li> </ul>						
<ul> <li>Assessment offered: once a year, summer semester</li> <li>Other prerequisites: Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises (particular emphasis to be placed on the setting up a herbarium) as specified at the beginning of the course.</li> <li>Assessment in module component o7-4A4FA-2-102: Field Excursions on the Fauna of Germany</li> <li>3 ECTS, Method of grading: (not) successfully completed</li> <li>log (approx. 1 to 2 pages per field trip)</li> <li>Assessment offered: once a year, summer semester</li> </ul>						
Alloca	tion of <sub>l</sub>	olaces				
Numbo allocat logy) v	er of pla ted as fo vith 180	ices: 180. Should the nur ollows: Places will primai ECTS credits. Should the	nber of applications rily be allocated to stree module be used in c	exceed the number c udents of the Bachel other subjects, there	of available places, p or's degree subject will be two quotas:	olaces will be Biologie (Bio- 95% of pla-
Bachelor's (2012)	s with 1 ma	jor Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam D ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 50 / 153

ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

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### **Teaching cycle**

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

### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title				Abbreviation		
Neurobiology 1				07-4S1NVO1-102-m	01	
Module	coord	inator		Module offered by		
holder o	holder of the Chair of Genetics			Faculty of Biology		
ECTS Method of grading		Only after succ. com	pl. of module(s)			
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	Admission prerequi	site to assessment: r	regular attendance o	of lab course
Content	ts				36.	
Neurob	iology	and methods in neurobi	ology, using Drosophi	ila as a neurogenetic	: model system.	
Intende	d learn	ning outcomes				
Student the rele	ts have vant m	acquired an advanced l ethods in neurobiology.	knowledge of the neu	robiology of a model	l organism and are a	ble to apply
Courses	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	man)		
P (no in	format	ion on SWS (weekly con	tact hours) and cours	e language available	e)	
<b>Method</b> module is	<b>l of ass</b> creditab	<b>essment</b> (type, scope, langua le for bonus)	age — if other than German, e	examination offered — if no	t every semester, informat	ion on whether
c) oral e didates med ab	examin (appro out the	ation of one candidate e ox. 20 minutes per candi e method and length of t	ach (approx. 30 minu date) or e) presentati he assessment prior t	tes) or d) oral exami on (approx. 20 to 30 to the course	nation in groups of a minutes); students	up to 3 can- will be infor-
Allocation of places Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio- logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Ma- thematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented sub- ject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce- dure, applicants who already have successfully completed at least one other module component of the respec- tive module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Ma- thematik (Mathematics)) at the time of application. This will be done as follows: First, applicants wil						
Bachelor's v (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (18c	nerated 26-Aug-2024 • exam ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 52 / 153

among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

# Additional information

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Workload

# Teaching cycle

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

# Module appears in

Bachelor' degree (1 major) Biology (2010)

Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title			Abbreviation		
Integrative Behavioral Biology			07-4S1NVO2-102-m01		
Module	e coord	inator		Module offered by	
holder logy	of the (	Chair of Behavioral Physic	ology and Sociobio-	Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequi and successful com beginning of the cou	site to assessment: pletion of the respec urse.	regular attendance of exercises ctive exercises as specified at the
Conten	ts				
Commu sing of viour, s	unicatio olfacto ocial b	on in the animal kingdom ry signals, temporal orga ehaviour, orientation me	n, neuroethology and nisation of behaviou chanisms.	behavioural develop r, adaptive feeding b	oment, perception and proces- behaviour, reproductive beha-
Intende	ed lear	ning outcomes			
Studen sentati	ts have ons on	e acquired an advanced k current studies on releva	nowledge in the area ant topics.	a of behavioural biol	ogy and are able to deliver pre-
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Gei	man)	
V + S (r	o infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>d of ass</b> creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	it every semester, information on whether
method c) oral didates med ab	ls of as examin (appro oout the	sessment: a) written exa ation of one candidate e ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentati ne assessment prior t	to 60 minutes) or b) ites) or d) oral exami on (approx. 20 to 30 to the course	) log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces	· · · ·		
Number of places Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subject Scomputational Ma- thematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented sub- ject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce- tive module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemistry), Physik (Physics), Ma- thematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third					

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 54 / 153
2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

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Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)

Module title	Module title Abbreviation					
Basics in Ligh	t- and Electron-Microsco	ру		07-4S1MZ1-102-m01		
Module coord	Module coordinator			,		
head of the De	epartment of Electronmic	roscopy	Faculty of Biology			
ECTS Metho	od of grading	Only after succ. con	npl. of module(s)			
5 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester	undergraduate	Admission prerequi and successful com beginning of the cou	site to assessment: pletion of the respe urse.	regular attendance of exercises ective exercises as specified at the		
Contents						
Fundamental	principles of confocal las	er scanning microsco	opy and electron mi	croscopy.		
Intended lear	ning outcomes					
Students have	e acquired theoretical kn	owledge and practica	l skills in the area c	of light and electron microscopy.		
Courses (type, r	number of weekly contact hours,	language — if other than Gei	rman)			
V + Ü (no infor	mation on SWS (weekly	contact hours) and co	ourse language avai	ilable)		
Method of ass module is creditab written examin	s <b>essment</b> (type, scope, langua le for bonus) nation (approx. 30 to 60	age — if other than German, · minutes)	examination offered — if r	ot every semester, information on whether		
Allocation of p	olaces					
Allocation of places Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio- logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce- dure, applicants who already have successfully completed at least one other module component of the respec- tive module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Ma- thematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked,						

firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 56 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

Additional information
Workload
Teaching cycle
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Module title				Abbreviation	
Analysis of Chromosomes					07-4S1MZ2-102-m01
Module coordinator				Module offered by	
head of	f the D	epartment of Electronmic	roscopy	Faculty of Biology	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate		Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.			
Conten	ts		• •		
Overvie	ew of th	e structure of chromosor	mes of somatic and m	neiotic cells.	
Intended learning outcomes					
Studen	ts are a	able to analyse chromoso	omal structures.		
6	-				

**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 is creditable for bonus)

written examination (approx. 30 to 60 minutes)

### Allocation of places

Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 58 / 153	
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012		

### **Additional information**

Workload

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### Teaching cycle

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

### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)

Module	title				Abbreviation
Special	Bioinf	ormatics 1			07-4S1MZ6-102-m01
Module coordinator				Module offered by	
holder	of the (	Chair of Bioinformatics		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester undergraduate A		Admission prerequie and successful com beginning of the cou	Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.		
Conten	ts				
Fundar dament tic reco	nental   tal prin nstruct	principles of the tree of li ciples of evolutionary bio ion.	fe, fundamental princ blogy (concepts), seq	ciples of phylogeneti uence analysis, RNA	ics (methods and markers), fun- structure prediction, phylogene-
Intende	ed leari	ning outcomes			
Studen netic re	ts are a constr	able to use software and uction.	databases for sequer	nce analysis, RNA str	ructure prediction and phyloge-
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
<b>Method of assessment</b> (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)					
log (approx. 10 to 20 pages) Language of assessment: German or English					
Allocati	ion of p	olaces			

Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, pla-

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 60 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

ces will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

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### Teaching cycle

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

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## Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)

Module title			Abbreviation		
Molecular modelling - From DNA to protein			07-4S1PS1-102-m01		
Module coord	inator		Module offered by		
holder of the (	Chair of Plant Physiology	and Biophysics	Faculty of Biology		
ECTS Metho	od of grading	Only after succ. com	pl. of module(s)		
5 nume	rical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: r pletion of the respec Irse.	regular attendance of exercises tive exercises as specified at the	
Contents					
This module w proteins as we specific softw	vill equip students with a ell as on the search for ar are.	dvanced knowledge on analysis and mode	on the structure and elling of plant macron	function of nucleic acids and molecules using databases and	
Intended lear	ning outcomes				
Students have are able to wo	e acquired a specialist kn rk with relevant database	owledge of the struct es and software.	ure-function relatior	nships of macromolecules and	
Courses (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Method of ass module is creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
computerised	practical examination (a	pprox. 6 hours)			
Allocation of	olaces				
Allocation of places Number of places: 18. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio- logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Ma- thematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented sub- ject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce- dure, applicants who already have successfully completed at least one other module component of the respec- tive module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Ma- themat					

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 62 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

# Additional information

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Workload

# Teaching cycle

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

# Module appears in

Bachelor' degree (1 major) Biology (2011)

Bachelor' degree (1 major) Biology (2010)

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Bachelor's with 1 major Computational Mathematics	;
(2012)	

Module title				Abbreviation	
Introduction to Methods in Plant Ecophysiology			07-4S1PS2-102-m01		
Module coordinator				Module offered by	
holder of	of the Ch	nair of Plant Physiology	and Biophysics	Faculty of Biology	
ECTS N	Method	l of grading	Only after succ. com	pl. of module(s)	
5 r	numerio	cal grade			
Duration	n M	Module level	Other prerequisites		
1 semest	ter u	undergraduate	Admission prerequis and seminar as well as specified at the b	site to assessment: r as successful comp reginning of the cour	regular attendance of exercises letion of the respective exercises rse.
Contents	S				
Complex cussion of	x experi of expe	ments to introduce stud rimental findings in a co	lents to the current s omprehensive scient	tate of research in pl ific context.	lant ecophysiology as well as dis-
Intended	d learni	ng outcomes			
Students and put t	s are ab these ir	ole to use current metho n a scientific context.	ds in plant ecophysio	ology as well as to de	ocument experimental findings
Courses	(type, nur	mber of weekly contact hours, la	anguage — if other than Ger	man)	
Ü + S (no	o inform	nation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method of module is control of the module is c	of asse	for bonus)	ge — if other than German, e	examination offered — if no	it every semester, information on whether
Allocatio	on of pla				
<b>Allocation of places</b> Number of places: 15. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subject Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the ti					

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 64 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

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### Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Modul	e title				Abbreviation	
Pharmaceutical Drugs in Plants				07-4S1PS3-102-mo:	1	
Module coordinator			Module offered by	<u> </u>		
holder	of the (	Chair of Pharmaceutical	l Biology	Faculty of Biology		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequi and seminar as well as specified at the b	site to assessment: as successful comp eginning of the cour	regular attendance o letion of the respect rse.	f exercises ive exercises
Conter	Its					
This m cals as the req	odule w well as juireme	vill introduce students t to their application in nts and analytical meth	to the major active age pharmacy. Microscopio nods of the pharmacop	nt groups in medicin c and phytochemica oeia will be explaine	al plants and phytop l analyses will be pe ed.	oharmaceuti- rformed and
Intend	ed leari	ning outcomes				
Studer cals as	its have well as	e acquired a specialist l s on the requirements a	<nowledge active="" ag<br="" on="">nd analytical methods</nowledge>	ents from medicinal of the pharmacopoe	l plants and phytoph eia.	armaceuti-
Course	<b>S</b> (type, n	umber of weekly contact hours	s, language — if other than Ger	man)		
Ü + S (	no infor	mation on SWS (weekly	y contact hours) and co	ourse language avail	able)	
Metho module is	<b>d of ass</b> s creditab	e <b>essment</b> (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	ot every semester, informati	on on whether
med al	s (appro pout the t <b>ion of p</b>	ox. 20 minutes per cano e method and length of places	the assessment prior t	on (approx. 20 to 30 o the course	minutes); students	will be infor-
Number of places Number of places: 6. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Bio- logy) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of pla- ces will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree sub- ject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Ma- thematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented sub- ject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places availa- ble in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this proce- dure, applicants who already have successfully completed at least one other module component of the respec- tive module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Ma- thematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be						
Bachelor's (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg ● ge cord Bachelor (18c	nerated 26-Aug-2024 • exan ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 66 / 153

following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

### Additional information

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Workload

# Teaching cycle

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

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### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)

Module title				Abbreviation	
Laboratory practical course I				07-S1-LP1-102-m01	
Module coordinator				Module offered by	
Coordir	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme:	ster	undergraduate	Admission prerequis as specified at the b mic advisory service	site to assessment: r eginning of the cour in advance.	regular attendance of lab course 'se; please consult with acade-
Conten	ts				
This pra respect	actical ive ins	coursed is offered by an i titution.	institution that is par	t of the University. C	ontents to be determined by the
Intende	ed learı	ning outcomes			
Studen	ts have	e developed skills which	qualify them to work	in their profession.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
Methoo module is	<b>d of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
method c) oral o didates med ab	ls of as examin 6 (appro 9 out the	sessment: a) written exa ation of one candidate ea ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e	,		
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)					

Module title				Abbreviation	
Excursion I					07-S1-Ex1-102-m01
Module	coord	inator		Module offered by	
Coordir	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme:	ster	undergraduate	Admission prerequis specified at the begi advisory service in a	site to assessment: i inning of the course; dvance.	regular attendance of field trip as ; please consult with academic
Conten	ts				
Conten	ts of th	e field trip to be determir	ned by the respective	institution.	
Intende	ed lear	ning outcomes			
Studen	ts have	e developed skills which	qualify them to work i	in their profession.	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
E (no in	format	ion on SWS (weekly cont	act hours) and course	e language available	2)
Methoo module is	<b>l of ass</b> creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
method c) oral e didates med ab	ls of as examin (appro out the	sessment: a) written exa ation of one candidate ea ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	) log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011)					
Bachelor' degree (1 major) Biology (2010)					
Bachel	Bachelor' degree (1 major) Mathematics (2012)				
Bachel	Bachelor' degree (1 major) Mathematics (2013)				
Bachel	or' deg	ree (1 major) Computation	nal Mathematics (201	12) 13)	
Bachel	or's de	gree (1 major, 1 minor) Bi	ology (Minor, 2010)	<i></i>	

Module title				Abbreviation	
Interdisciplinary Project I					07-S1-IP1-102-m01
Module coordinator				Module offered by	
Coordir	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis sions as specified at academic advisory s	site to assessment: 1 t the beginning of th ervice in advance.	regular attendance of project ses- e course; please consult with
Conten	ts				
Conten	ts of th	e project to be determine	ed by the competent of	coordinators; conter	nts will vary according to topic.
Intende	ed leari	ning outcomes			
Studen	ts have	e developed skills which	qualify them to work	in their profession.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R (no ir	format	ion on SWS (weekly cont	act hours) and course	e language available	2)
Methoo module is	<b>d of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
method c) oral o didates med ab	ls of as examin (appro out the	sessment: a) written exa ation of one candidate es ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	) log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011)					
Bachelor' degree (1 major) Biology (2010)					
Bachel	Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2012)				
Bachel	or' deg	ree (1 major) Computation	nal Mathematics (201	12)	
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (201	13)	
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)					

Module title			Abbreviation		
External Practical Course				07-5EP-102-m01	
Module coordinator			Module offered by		
Coordinator Bi	ioCareers		Faculty of Biology		
ECTS Metho	od of grading	Only after succ. com	pl. of module(s)		
10 numer	rical grade				
Duration	Module level	Other prerequisites			
1 semester	undergraduate	Admission prerequis as specified at the b mic advisory service	site to assessment: r eginning of the cour in advance.	regular attendance of lab course 'se; please consult with acade-	
Contents					
Students will o to be determin	complete a placement at ned by the respective inst	an authority, a non-u titution.	niversity research in	stitution or a business. Contents	
Intended learn	ning outcomes				
Students are f qualify them to	amiliar with the structure o work in their professior	es of external instituti n.	ons and businesses	and have developed skills which	
Courses (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
P (no informat	ion on SWS (weekly cont	act hours) and cours	e language available	2)	
Method of ass module is creditab	e <b>ssment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
methods of as c) oral examin didates (appro med about the	sessment: a) written exa ation of one candidate ea ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-	
Allocation of p	olaces				
Additional info	ormation				
Workload					
Teaching cycle	e				
Referred to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module appears in					
Bachelor' degree (1 major) Biology (2011)					
Bachelor' degree (1 major) Biology (2010)					
Bachelor' degi	Bachelor' degree (1 major) Mathematics (2012) Rachelor' degree (1 major) Mathematics (2012)				
Bachelor' degi	Bachelor' degree (1 major) (computational Mathematics (2012)				
Bachelor' degi	ree (1 major) Computation	nal Mathematics (201	<i>)</i> 13)		
Bachelor's deg	gree (1 major, 1 minor) Bi	ology (Minor, 2010)			

Module title			Abbreviation		
Excursion II			07-S2-EX2-102-m01		
Module coordinator				Module offered by	
Coordir	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme:	ster	undergraduate	Admission prerequies specified at the beg advisory service in a	site to assessment: i inning of the course; idvance.	regular attendance of field trip as ; please consult with academic
Conten	ts				
[Version project	n 1: Coi to be c	ntents of the field trip to l letermined by the compe	be determined by the tent coordinators; co	respective institution ntents will vary acco	on.] [Version 2: Contents of the ording to topic.]
Intende	ed leari	ning outcomes			
Studen	ts have	e developed skills which	qualify them to work	in their profession.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
E (no in	format	ion on SWS (weekly cont	act hours) and course	e language available	2)
Methoo module is	<b>d of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
method c) oral e didates med ab	ls of as examin 6 (appro oout the	sessment: a) written exa ation of one candidate e ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)					
Module title				Abbreviation	
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Interdisciplinary Project II					07-S2-IP2-102-m01
Module	e coord	inator		Module offered by	
Coordir	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis sions as specified at academic advisory s	site to assessment: 1 t the beginning of th ervice in advance.	regular attendance of project ses- e course; please consult with
Conten	ts				
Conten	ts of th	e project to be determine	ed by the competent of	coordinators; conter	nts will vary according to topic.
Intende	ed learı	ning outcomes			
Studen	ts have	e developed skills which	qualify them to work	in their profession.	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R (no ir	Iformat	ion on SWS (weekly cont	act hours) and course	e language available	e)
Methoo module is	<b>d of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
method c) oral o didates med ab	ls of as examin s (appro oout the	sessment: a) written exa ation of one candidate e ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	) log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ıg cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011)					
Bachel	or' deg	ree (1 major) Biology (201	10)		
Bachel	or' deg	ree (1 major) Mathematic	S (2012)		
Bachel	or deg	ree (1 major) Mathematic	5 (2013) nal Mathematics (201	12)	
Bachel	or' deg	ree (1 major) Computation	nal Mathematics (201	13)	
Bachel	or's de	gree (1 major, 1 minor) Bi	ology (Minor, 2010)	<i></i>	

Module title				Abbreviation	
Laboratory Practical Course II				07-S2-LP2-102-m01	
Module	coord	inator		Module offered by	
Coordir	nator Bi	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Admission prerequis as specified at the b mic advisory service	site to assessment: r reginning of the cour r in advance.	regular attendance of lab course rse; please consult with acade-
Conten	ts				
This pra respect	actical ive ins	coursed is offered by an i titution.	institution that is par	t of the University. C	ontents to be determined by the
Intende	ed learn	ning outcomes			
Studen work in	ts are f their p	amiliar with the structure rofession.	es of internal institution	ons and have develo	pped skills which qualify them to
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (no in	format	ion on SWS (weekly cont	act hours) and course	e language available	2)
Method	l of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
method c) oral e didates med ab	ls of as examin (appro out the	sessment: a) written exa ation of one candidate ea ox. 20 minutes per candid e method and length of th	mination (approx. 45 ach (approx. 30 minu date) or e) presentation ne assessment prior t	to 60 minutes) or b) tes) or d) oral exami on (approx. 20 to 30 o the course	log (approx. 10 to 20 pages) or nation in groups of up to 3 can- minutes); students will be infor-
Allocati	ion of p	olaces	· ·		
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)					

Module	Module title Abbreviation				
Organi	sation	and Safety in Bioscience	S		07-SQF-OSB-102-m01
Module	e coord	inator		Module offered by	<u> </u>
Coordi	nator B	ioCareers		Faculty of Biology	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
nisms, help er the bio sibilitie	hygien hygien sure a science s of ma	e procedures and hazard n effective and efficient w e/biotech sector. Process anagers/supervisors, app	ous substances, wor vorkflow in the biosci based project mana praisal interviews, tar	king with lab animal ences. Structure and gement. HR manage get agreements, ma	ls. Fundamental concepts that d organisation of institutions in ement in the biosciences, respon- nagement styles.
Intend	ed lear	ning outcomes			
Studen and are on. The	its have e famili ey are a	e developed a fundament ar with fundamental orga lso familiar with fundame	al knowledge of the inisational principles ental principles of pro	regulations governin that are relevant for ocess-based project	g work in the bioscience sector work in research and producti- work in the biosciences.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + S (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)
Metho module is	<b>d of ass</b> s creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
a) writt 10 pag	en exai es)	mination (30 to 60 minut	es) and b) presentati	on (approx. 10 minu	tes) or term paper (approx. 5 to
Allocat	ion of p	olaces			
Number allocat logy) w ces wil 5% of p ject Bio themat ject Bio ble in o the oth places, course dure, a tive mo they be plicant of ECTS	er of pla ed as fo ith 180 l be allo blaces ( blogie ( cics and blogy (a blogy (a bl	ices: 15. Should the numl bollows: Places will primar ECTS credits. Should the bocated to students of the ca minimum of one partic Biology) with 60 ECTS cred Mathematik (Mathemat is well as potentially to st bota exceed the number of ca. Should there be, within will be a uniform regulation odule component that a ats who already have suc- ill be given preferential c available. Selection proce- ous academic achievements they have achieved and	ber of applications ex- ily be allocated to stu- e module be used in or Bachelor's degree su- ipant in total) will be edits and to students ics), each with 180 E0 tudents of other 'imp applications, the ren in one module compo- on for the courses of re concerned will be cessfully completed a onsideration. A waiti ess group 1 (95%): Pla- ents. For this purpose I their average grade	acceed the number of udents of the Bachel other subjects, there ubject Biologie (Biolo allocated to student of the Bachelor's de CTS credits, as part of orting' subjects). Sh naining places will b onent, several course one module compor allocated in a standa at least one other mo ng list will be mainta acces will primarily be and assessments t	available places, places will be lor's degree subject Biologie (Bio- will be two quotas: 95% of pla- ogy) with 180 ECTS credits and ts of the Bachelor's degree sub- egree subjects Computational Ma- of the application-oriented sub- ould the number of places availa- be allocated to applicants from es with a restricted number of nent. In this case, places on all ardised procedure. In this proce- odule component of the respec- ained and places re-allocated as e allocated according to the ap- ranked according to the number taken during their studies or of

all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 75 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

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components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

#### Additional information

Workload

--

### Teaching cycle

--

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

### Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010)

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

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

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

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)



# Application-oriented Subject Chemistry

(ECTS credits)



# Application-oriented Subject Chemistry Compulsory Courses

(26 ECTS credits)

Module title			Abbreviation			
Introduction to Physics for Students of Non-physics-related Minor Subjects			11-EFNF-072-m01			
Module coordinator Module offered			Module offered by			
Managing Director of the Institute of Applied Physics Faculty of Physi			Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
7	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate				
Conten	te		<u> </u>			
Mochai	nice vi	bration theory thermody	namics optics scion	co of alactricity. Ata	mic and Nuclear Phy	sics
Intond	d loor	ning outcomes	names, optics, scien	ice of electricity, Alo	inic and Nuclear Fily	5105.
	ed tear					
The stu	dents	have knowledge of the p	rinciples of Physics.			
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ger	man)		
V + V (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho	d of ass	<b>Sessment</b> (type, scope, langua	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
module is	s creditab	le for bonus)	-			
written	exami	nation (approx. 120 minu	ites)			
Allocat	ion of <sub>l</sub>	olaces				
Only as	s part o	f pool of general key skil	ls (ASQ): 10 places. P	laces will be allocate	ed by lot.	
Additio	nal inf	ormation				
Worklo						
WOIKIU	au					
			-			
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Biochemist	ry (2011)			
Bachel	or' deg	ree (1 major) Biochemist	ry (2013)			
Bachel	or' deg	ree (1 major) Biochemist	ry (2009)			
Bachel	or' deg	ree (1 major) Biology (20	11)			
Bachel	or deg	ree (1 major) Biology (20	07) 19)			
Bachel	or' deg	ree (1 major) Chemistry (	2007)			
Bachel	or deg or deg	ree (1 major) Chemistry (	2007) 2008)			
Bachel	or' deg	ree (1 major) Chemistry (	2000) 2010)			
Bachel	Bachelor' degree (1 major) Chemistry (2009)					
Bachelor' degree (1 major) Geography (2007)						
Bachelor' degree (1 major) Geography (2008)						
Bachelor' degree (1 major) Geography (2010)						
Bachel	or' deg	ree (1 major) Computer S	cience (2007)			
Bachel	or' deg	ree (1 major) Computer S	cience (2014)			
Bachel	or' deg	ree (1 major) Computer S	cience (2010)			
Bachel	or deg	ree (1 major) Food Chemi	ISTRY (2009)			
васпе	or aeg	ree (1 major) Mathematic	.5 (2008)		, waa data wa	
(2012)	with 1 ma	joi computational Mathematics	cord Bachelor (180	eCTS) Computational Mathe	ematics - 2012	page /9 / 153



Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Biomedicine (2009) Bachelor' degree (1 major) Biomedicine (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title				Abbreviation		
Physical Chemistry 1				08-PC1-092-m01		
Module coordinator Module offered by						
lecturer of lecture "Grundlagen der Quantenmechanik and Spektroskopie" (Principles of Quantum Mechanics and Spectroscopy)				l and Theoretical Cho	emistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester       undergraduate       Admission prerequisite to assessment: s ses in the respective classes as specified (usually 70% of exercises to be successful ar attendance of exercises (usually a ma sed absence)		successful completion d at the beginning o fully completed) as v aximum of 2 inciden	on of exerci- f the course vell as regu- ts of unexcu-			
Content	ts					
This mo the basi the moc UV-VIS s tation, c sted abo	odule ir is of th dule fo spectro differer ove.	ntroduces students to the e following models: par cuses on vibrational spe oscopy. In addition, the ntial equations, Fourier	e fundamental princip ticle in a box, harmon ectroscopy, angular m module discusses line transform and orthogo	oles of quantum mec ic oscillator and rigio omentum quantisati ear operators, eigenv onal functions as ma	hanics. It analyses r d rotor. As regards sp on, microwave spec value problems, mat thematical bases of	nolecules on pectroscopy, troscopy and rix represen- the topics li-
Intende	d lear	ning outcomes				
Student to descr quantur	ts are a ribe dif m mec	ble to explain key mode ferent spectroscopic me hanics.	els of quantum mecha ethods. In addition, st	nics and to apply the udents know how to	em to molecules. The apply the mathema	ey are able tical bases of
Courses	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
V + Ü + V	V + Ü (	no information on SWS	(weekly contact hours	) and course languag	ge available)	
<b>Method</b> module is	l <b>of ass</b> creditab	s <b>essment</b> (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informati	on on whether
a) 1 to 3 nutes ea minutes	writte ach; 3 5) or c)	n examinations (1 writte written examinations: 6 oral examination in gro	n examination: appro o minutes each) or b) ups (groups of 2, appı	x. 90 minutes; 2 writ oral examination of rox. 30 minutes)	ten examinations: 6 one candidate each	o or 90 mi- (approx. 20
Allocati	on of p	olaces				
Addition	nal info	ormation				
Workloa	ad					
			_			
Teachin	ig cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelo Bachelo Bachelo Bachelo	Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Chemistry (2010)					
Bachelor's w (2012)	vith 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam D ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 81 / 153



Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title				Abbreviation	
Introdu Subject	Introduction to Inorganic Chemistry for Students of Mathematics and other Subjects				08-CM1-112-m01
Module	e coord	inator		Module offered by	
lecture Chemis	r of lect stry)	ture "Experimentalchemi	e" (Experimental	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Fundan	nental	principles of general and	inorganic chemistry.		
Intende	ed lear	ning outcomes			
Studen	ts have	become familiar with th	e fundamental princi	ples of general and i	inorganic chemistry.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V (no ir	format	ion on SWS (weekly cont	act hours) and cours	e language available	2)
Method module is	<b>d of ass</b> s creditab	<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
written	exami	nation (approx. 90 minut	es)		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Mathematics (2014)					
Bachelor' degree (1 major) Mathematics (2012)					
Bachel	Bachelor' degree (1 major) Mathematics (2013)				
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20:	14)	
Bachel	or deg	ree (1 major) Computation	nal Mathematics (20:	12)	
Bachelor' degree (1 major) Computational Mathematics (2013)					

Module title Abbreviation						
Organic Chemistry 1				08-0C1-092-m01		
Module	coord	inator		Module offered by		
holder	of the F	Professorship of Organic	Chemistry	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 Semes	ster	undergraduate	Admission prerequi ses in the respective (usually 70% of exe lar attendance of ex sed absence).	site to assessment: s e classes as specifie rcises to be success ercises (usually a ma	successful completic d at the beginning of fully completed) as v aximum of 2 incident	on of exerci- f the course vell as regu- ts of unexcu-
Content	ts					
This mo the bon organic dition a	odule p Iding s compo Ind elir	rovides students with ar ituation of carbon and ir ounds. The module also nination reactions as we	n overview of the fund troduces students to discusses the fundan Il as synthesis planni	amental principles of the nomenclature of nental principles of s ng.	of organic chemistry. simple and modera tereochemistry, sub	It examines tely complex stitution, ad-
Intende	ed leari	ning outcomes				
Student of nome lecules. that put synthes	ts knov enclatu . They a rpose, ses.	v important categories o are to determine simple s are able to describe and they can analyse and ca	f substances in organ substance names. Stu formulate some of the tegorise the character	ic chemistry. They an idents are able to an e most important rea ristic reaction condit	re able to use differe alyse the stereocher actions in organic cha ions and can use the	nt systems nistry of mo- emistry. For em for simple
Courses	<b>S</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
V + Ü (n	infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
<b>Method</b> module is	<b>l of ass</b> creditab	<b>essment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
a) 1 to 3 nutes e minutes	3 writte ach; 3 s) or c)	n examinations (1 writte written examinations: 6 oral examination in grou	n examination: appro o minutes each) or b) ups (groups of 2, appr	x. 90 minutes; 2 writ oral examination of ox. 30 minutes)	ten examinations: 6 one candidate each	o or 90 mi- (approx. 20
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
	- 4					
WORKIO	au					
Teachin	ig cycl	8				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"						
Module appears in						
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Mathematics (2012)						
ваcnelor's v (2012)	with 1 maj	or computational Mathematics	JMU Würzburg • ge cord Bachelor (18c	enerated 26-Aug-2024 • exam DECTS) Computational Mathe	n. reg. data re- matics - 2012	page 84 / 153

Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011) First state examination for the teaching degree Gymnasium Chemistry (2009)



# Application-oriented Subject Chemisty Compulsory Electives

(ECTS credits)

Module	Module title Abbreviation					
Theoretical Models in Chemistry 08-T				08-TC-092-m01		
Module	coord	inator		Module offered by	Module offered by	
lecture	r of lect	ture "Quantenchemie"		Institute of Physical	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
3	nume	rical grade				
Duratio	n		Other prerequisites			
Duratio	/ <b>II</b>					
1 Seme:	ster	undergraduate	ses in the respective (usually 70% of exer lar attendance of exe sed absence).	classes as specifie rcises to be successf ercises (usually a ma	d at the beginning of the course fully completed) as well as regu- aximum of 2 incidents of unexcu-	
Conten	ts					
This mo spin, th tion and	odule p ie Paul d excite	rovides students with de i principle, Slater determi ed states, the Born-Oppe	eper insights into adv inants, the Hartree-Fo nheimer approximati	vanced topics in qua ock method, correlat on and bonding mod	antum chemistry. It focuses on ion energy, configuration interac- dels of H2+.	
Intende	ed learı	ning outcomes				
Studen	ts are a	able to describe excited s	tates of molecules w	ith the help of key co	oncepts and models.	
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Method module is a) 1 to 3	l of ass creditab writte	eessment (type, scope, language le for bonus) n examinations (1 writter each: 3 written examinat	ge — if other than German, e n examination: approx	xamination offered — if no x. 90 minutes; 2 writ	t every semester, information on whether ten examinations: approx. 60 examination of one candidate	
each (a	pprox.	20 minutes) or c) oral exa	amination in groups (	(groups of 2, approx.	. 30 minutes)	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Additio	inac init					
worklo	ad					
Teachir	ng cycl	8				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module appears in						
Bachelor' degree (1 major) Chemistry (2010)						
Bachelo	Bachelor' degree (1 major) Chemistry (2009)					
Bachelo	or' deg	ree (1 major) Mathematic	s (2012)			
Bachelo	or' deg	ree (1 major) Mathematic	s (2013)			
Bachelo	or' deg	ree (1 major) Computation	nal Mathematics (200	09)		
Bachelo	or' deg	ree (1 major) Computation	nal Mathematics (201	12)		
Bachelo	or' deg	ree (1 major) Computation	nal Mathematics (201	13)		
Bachelo	or' deg	ree (1 major) FOKUS Chen	nistry (2011)			

Module title				Abbreviation		
Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry				tum Chemistry	08-PC3-092-m01	
Module coordinator Mo			Module offered by	Module offered by		
lecturer of lecture "Ouantenchemie"			Institute of Physica	l and Theoretical Ch	emistry	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
6	nume	rical grade		, ,,		
Duratio	n		Other prerequisites			
<b>Duration</b>	stor	undorgraduato	Admission proroqui	cita ta accoccmente	successful completiv	on of overci
ses in the respective classes as specified at the beginning (usually 70% of exercises to be successfully completed) as lar attendance of exercises (usually a maximum of 2 incide sed absence).		d at the beginning o fully completed) as v aximum of 2 inciden	f the course vell as regu- ts of unexcu-			
Conten	nts					
This m	odule d	liscusses the fundamer	ntal principles of quant	um chemistry and sy	mmetry in chemistry	y.
Intend	ed lear	ning outcomes				
Studer mistry	nts have and are	e become familiar with able to apply the know	the fundamental princi vledge they have devel	ples of quantum che oped.	emistry and symmetr	y in che-
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Gei	rman)		
V + Ü +	· V + Ü (	no information on SWS	(weekly contact hours	) and course langua	ge available)	
Metho module is a) 1 to ; each; 3	d of ass s creditab 3 writte 3 writte	sessment (type, scope, lang ele for bonus) en examinations (1 writt n examinations: 60 mir examination in groups	uage — if other than German, en examination: 90 mi nutes each) or b) oral e:	examination offered — if no nutes; 2 written examination of one ca	nt every semester, informati minations: 60 or 90 n andidate each (appro	on on whether minutes DX. 20 minu-
	tion of			o minutes)		
Allocal		JIACES				
 A						
Αααιτιά	onat ini	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Biochemis	stry (2013)			
Bachel	Bachelor' degree (1 major) Chemistry (2010)					
Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Mathematics (2012)						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013)						
Bachelor' degree (1 major) Computational Mathematics (2009)						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2009)					
Bachel	or' deg	ree (1 major) Computat	ional Mathematics (20	13)		
Bachel	or' deg	ree (1 major) FOKUS Ch	emistry (2011)	_		
First st	ate exa	mination for the teachi	ng degree Grundschule	Chemistry (2009)		
First st	ate exa	mination for the teachi	ng degree Hauptschule	e Chemistry (2009)		
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exan DECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 88 / 153



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

Module title Abbreviation						
Organic Chemistry 2 08-0C2-102-m01						
Module	coord	inator		Module offered by		
holder	of the C	Chair of Physically Organi	c Chemistry	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
9	nume	rical grade	08-0C1			
Duratio	n	Module level	Other prerequisites			
1 seme:	ster	undergraduate	Admission prerequises in the respective (usually 70% of exer- lar attendance of ex- sed absence).	site to assessment: s e classes as specifie rcises to be successf ercises (usually a ma	successful completic d at the beginning of fully completed) as w aximum of 2 incident	n of exerci- the course vell as regu- ts of unexcu-
Conten	ts					
This mo the exa on reac well as py, mas	odule ir mple o tions to rearrar ss spec	ntroduces students to the f carbonyl compounds, it o complex reaction mech ngement. In addition, it ir trometry and NMR spectr	e rules of aromaticity extends the student anisms. The course a atroduces students to roscopy.	and discusses speci s' knowledge of sub Iso focuses on oxida the spectroscopic n	fic reactions of arom stitution, eliminatior ation and reduction r nethods of infrared s	atics. Using and additi- eactions as pectrosco-
Intende	ed learr	ning outcomes				
bonyl c they ca unknow to draw	ompou n plan vn reac v conclu	nds. They are able to des and formulate multi-stag tions. Students are able to usions regarding the mole	e criteria for aromatic scribe specific reactic e syntheses with con to describe importan ecular structure.	nty. They can analysions of carbonyls and pplex reaction mecha t spectroscopic meth	aromatics. For that panisms and can trans nods, to evaluate a s	sfer them to
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + V +		nformation on SWS (weel	kly contact hours) an	d course language a	vailable)	
Methoo module is	l Of ass	s <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	on on whether
a) 1 to 3 or 90 m each (a Langua	y writte iinutes pprox. ge of a	n examinations (1 writter each; 3 written examinat 20 minutes) or c) oral ex ssessment: German, Eng	examination: appro ions: approx. 60 min amination in groups ( lish	x. 90 minutes; 2 writ utes each) or b) oral (groups of 2, approx	ten examinations: a examination of one 30 minutes)	pprox. 60 candidate
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelo Bachelo Bachelo Bachelo	Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Mathematics (2012)					D350.00 / 152
(2012)	with 1 Maj		cord Bachelor (18c	ECTS) Computational Mathe	matics - 2012	paze 90 / 153

Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011)



# **Application-oriented Subject Computer Science**

(ECTS credits)

Module title Abbreviation				Abbreviation	
Algorithmic Graph Theory					10-I-AGT-122-m01
Module	coord	inator		Module offered by	
holder	of the O	Chair of Computer Scienc	e l	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Where applicable, p ning of the course (e	rerequisites as spec e.g. completion of ex	ified by the lecturer at the begin- kercises).
Conten	ts				
We disc colourin of graph program	cuss typ ngs, wo h probl ns or h	pical graph problems: We ork with planar graphs an ems, we also become far ow we show that they are	e solve round trip pro d find out how the ra miliar with new conce e fixed parameter con	blems, calculate ma nking algorithm of G pts, for example hov nputable.	ximal flows, find matchings and oogle works. Using the examples w we model problems as linear
Intende	ed learn	ning outcomes			
The stu cipants course,	dents a are ab studer	are able to model typical le to decide which tool fr nts learn in detail how to	problems in compute om the course helps estimate the run time	er science as graph p solve a given graph e of given graph algo	problems. In addition, the parti- problem algorithmically. In this prithms.
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>l of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written tion dat aminati Langua	examin te, the ion in g ge of a	nation (approx. 50 to 60 n written examination can groups (one candidate ea ssessment: English, Gerr	minutes); if announce be replaced by an ora ch: 15 minutes, group nan if agreed upon w	ed by the lecturer by al examination of on os of 2: 20 minutes, ith the examiner	four weeks prior to the examina- e candidate each or an oral ex- groups of 3: 25 minutes)
Allocati	ion of p	olaces	· · ·		
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	e			
			,		
Referre	<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)				
Module appears in					
Bacheld Bacheld Bacheld Bacheld Master' Master'	Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Computational Mathematics (2012)				

(2012)

Module	title				Abbreviation	
Algorit	hm and	data structures			10-I-ADS-102-m01	
Module	coord	inator		Module offered by		
Dean of	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade		<u> </u>		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequis	site to assessment: e ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	ts		· · · ·			
Design ta types	and ar s, lists,	nalysis of algorithms, recu trees, graphs, basic grap	ursion vs. iteration, so oh algorithms, progra	ort and search methomming in Java.	ods, data structures,	, abstract da-
Intende	ed lear	ning outcomes				
The stu student prograr	dents a ts are f ns. The	are able to independently amiliar with the basic pare e students are able to est	y design algorithms a radigms of the desigr imate the run-time be	s well as to precisely of algorithms and a chaviour of algorithm	y describe and analy are able to apply the as and to prove their	se them. The m in practical correctness.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
<b>Methoc</b> module is	<b>l of ass</b> creditab	<b>sessment</b> (type, scope, langua ole for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	on on whether
tion dat aminati tion of examin	te, the ion in g one ca ation i	written examination can groups. A 80 to 90 minute ndidate each, a 30 minut n groups of 3.	be replaced by an ora e written examination re (approx.) oral exam	al examination of on is equivalent to a 20 ination in groups of	e candidate each or o minute (approx.) o 2 and a 40 minute (a	an oral ex- ral examina- approx.) oral
/ liocut						
Additio	nal inf	ormation	-			
Auditio	Παι ΠΠ					
	- J					
WORKIO	au					
Teachir	ıg cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
§ 49 (1) § 69 (1)	1. a) lı 1. a) lı	nformatik Theoretische In nformatik Theoretische In	ıformatik, Algorithme ıformatik, Algorithme	n und Datenstruktur n und Datenstruktur	en en	
Module	appea	ars in				
Bachelo	or' deg	ree (1 major) Computer S	cience (2010)			
Bachelo	or' deg	ree (1 major) Mathematic	s (2012)			
Bachelo	Bachelor' degree (1 major) Mathematics (2013)					
Bachelo	or' deg	ree (1 major) Economathe	ematics (2012)			
Bachel	or deg or deg	ree (1 major) Computatio	nal Mathematics (203	12) 12)		
Master'	s degr	ee (1 major) Digital Huma	nities (2011)			
First sta	ate exa	mination for the teaching	g degree Realschule C	Computer Science (20	012)	
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2009)	
<b>.</b>						
Bachelor's ( (2012)	with 1 ma	jor computational Mathematics	JMU Wurzburg • ge cord Bachelor (180	ererated 26-Aug-2024 • exam ECTS) Computational Mathe	n reg. data re- ematics - 2012	page 94 / 153

Module	e title				Abbreviation	
Softwa	re Tech	nnology			10-l-ST-102-m01	
Module	e coord	inator		Module offered by		
Dean o	of Studi	es Informatik (Computer	r Science)	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate	Admission prerequi announced by the lo	site to assessment: e ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	nts	£				
Object bases cesses	-oriente and ob , unifie	ed software developmer ject-relational mapping, d process, agile softwar	t with UML, developm foundations of web p e development, projec	ent of graphical user rogramming (HTML, X ct management, qua	r interfaces, foundat XML), software deve lity assurance.	ions of data- lopment pro-
Intend	ed lear	ning outcomes				
The stu softwa	udents re syste	possess a fundamental ems.	theoretical and praction	cal knowledge on the	e design and develop	oment of
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (I	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho module is	<b>d of ass</b> s creditab	sessment (type, scope, langu	lage — if other than German,	examination offered — if no	t every semester, informati	on on whether
tion of examir <b>Allocat</b>	one ca nation i t <b>ion of j</b>	ndidate each, a 30 minu n groups of 3. places	ite (approx.) oral exan	nination in groups of	2 and a 40 minute (a	approx.) oral
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regulatio	ns for teaching-degree progra	ummes)		
§ 49 (1	) 1. b) [	atenbanksysteme und	Softwaretechnologie			
§ 69 (1	) 1. b) [	Datenbanksysteme und	Softwaretechnologie			
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Computer ( ree (1 major) Mathemati	Science (2010)			
Bachel	Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2012)					
Bachel	Bachelor' degree (1 major) Hattematics (2013) Bachelor' degree (1 major) Economathematics (2012)					
Bachel	or' deg	ree (1 major) Business li	nformation Systems (2	2013)		
Bachel	Bachelor' degree (1 major) Human-Computer Systems (2010)					
Bachel	or' deg	ree (1 major) Computati	onal Mathematics (20	12)		
Bachel	or' deg	ree (1 major) Computati	onal Mathematics (20	13)		
Bachel	or' deg	ree (1 major) Aerospace	Computer Science (20	009)		
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • g cord Bachelor (180	enerated 26-Aug-2024 • exam D ECTS) Computational Mathe	n. reg. data re- matics - 2012	page 95 / 153



Bachelor' degree (1 major) Aerospace Computer Science (2011) First state examination for the teaching degree Realschule Computer Science (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title				Abbreviation
Practical Cou	rse in Programming		10-I-PP-102-m01	
Module coord	linator		Module offered by	
Dean of Stud	ies Informatik (Computer	Science)	Institute of Comput	er Science
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)	
10 (not)	successfully completed			
Duration	Module level	Other prerequisites		
1 semester	undergraduate	Admission prerequis announced by the le	site to assessment: e octurer at the beginn	exercises (type and scope to be ing of the course).
Contents				
The program	ning language Java. Indep	endent creation of sr	nall to middle-sized	, high-quality Java programs.
Intended lear	ning outcomes			
The students	are able to independently	y develop small to mi	ddle-sized, high-qua	ality Java programs.
Courses (type,	number of weekly contact hours, l	anguage — if other than Ger	man)	
P (no informa	tion on SWS (weekly cont	act hours) and course	e language available	.)
Method of as module is credita	<b>sessment</b> (type, scope, langua ble for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
tion date, the amination in tion of one ca examination	written examination can groups. A 80 to 90 minute Indidate each, a 30 minute in groups of 3.	be replaced by an ora e written examination e (approx.) oral exam	al examination of on is equivalent to a 20 ination in groups of	e candidate each or an oral ex- o minute (approx.) oral examina- 2 and a 40 minute (approx.) oral
Allocation of	places			
Additional in	formation			
Additional inf	formation on module dura	tion: 1 to 2 semesters	5.	
Workload				
Teaching cyc	le			
Referred to ir	LPOI (examination regulation	s for teaching-degree progra	mmes)	
§ 49 (1) 1. c)   § 69 (1) 1. d)	nformatik Praktische Soft Informatik Praktische Soft	wareentwicklung wareentwicklung		
Module appe	ars in			
Bachelor' deg	gree (1 major) Computer S	cience (2010)		
Bachelor' deg	gree (1 major) Mathematic	s (2012)		
Bachelor' deg	gree (1 major) Mathematic	S (2013)		
Bachelor' deg	gree (1 major) Computatio	nal Mathematics (201	1 <i>2)</i>	
Bachelor' deg	gree (1 major) Computatio	Computer Science (20)	· <i>·</i> · (09)	
Bachelor' deg	gree (1 major) Aerospace (	Computer Science (20	11)	
Master's deg	ree (1 major) Digital Huma	nities (2011)		
First state exa	amination for the teaching	g degree Realschule C	omputer Science (20	012)
First state exa	amination for the teaching	g degree Gymnasium	Computer Science (2	2009)

Module title				Abbreviation	
Practica	al cour	se in software			10-I-SWP-102-m01
Module	coord	inator		Module offered by	
Dean of	Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
Content	ts				
Comple cation o tion and	tion of of solut d delive	a project assignment in ion components (e. g. UM ery of the runnable softwa	groups, problem ana ML) and milestones, ı are product in a collo	lysis, creation of req user manual, prograr quium.	uirements specifications, specifi- nming documentation, presenta-
Intende	d lear	ning outcomes			
The stu small te	dents p eams.	possess the practical skil	ls for the design, dev	velopment and execu	ition of a software project in
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)
<b>Method</b> module is	<b>l of ass</b> creditab	e <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
comple	tion of	project assignments, pre	esentation		
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachin	ig cycl	e			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
§ 49 (1) § 69 (1)	1. c) In 1. d) Ir	formatik Praktische Soft nformatik Praktische Soft	wareentwicklung wareentwicklung		
Module	appea	irs in			
Bachelo Bachelo Bachelo Bachelo First sta First sta	Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) First state examination for the teaching degree Realschule Computer Science (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)				

Module	title				Abbreviation
Digital computer systems				10-I-RAL-102-m01	
Module	e coord	inator		Module offered by	
Dean of	fStudie	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis announced by the le	site to assessment: o ecturer at the beginn	exercises (type and scope to be ing of the course).
Conten	ts				
Introdu cuits, h chy.	ction to ardwar	o digital technologies, Bo re description languages,	oolean algebras, com structure of a simple	binatory circuits, syr processor, machine	nchronous and asynchronous cir- e programming, memory hierar-
Intende	ed leari	ning outcomes			
The stu ming of design	dents   f easy r of digit	bossess a knowledge of t nicroprocessors as well a ral systems.	he fundamentals of c is knowledge for the a	ligital technologies ( application of hardw	up to the design and program- vare description languages for the
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	<b>d of ass</b> creditab	<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written tion dat aminati tion of examin	examin te, the ion in g one can ation in	nation (approx. 80 to 90 written examination can groups. A 80 to 90 minute ndidate each, a 30 minut n groups of 3.	minutes). If announce be replaced by an ora e written examination e (approx.) oral exam	ed by the lecturer by al examination of on is equivalent to a 20 ination in groups of	four weeks prior to the examina- e candidate each or an oral ex- o minute (approx.) oral examina- 2 and a 40 minute (approx.) oral
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
§ 69 (1)	1. c) lr	nformatik Technische Info	ormatik		
Module	appea	ars in			
Bachel	or' deg	ree (1 major) Computer S	cience (2010)		
Bachel	or' deg	ree (1 major) Mathematic	s (2012)		
Bachel	or' deg	ree (1 major) Mathematic	s (2013)		
Bachel	or' degi	ree (1 major) Computatio	nal Mathematics (20:	12)	
First sta	or deg	ree (1 major) Computatio	nai Matnematics (20: r degree Gymnasium	13) Computer Science (r	2000)
11131 310			acgree oyiiinasiulli	computer Science (2	2009)

Module	title				Abbreviation
Information Transmission					10-l-lÜ-102-m01
Module	coord	inator		Module offered by	
holder	of the (	Chair of Computer Science	e III	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Admission prerequis announced by the le	site to assessment: o cturer at the beginn	exercises (type and scope to be ing of the course).
Conten	ts				
Introdu theory, duction	ction to spectr to the	o probability calculus, co um and Fourier transform structure of computer ne	ding theory, coding fo , modulation techniq etworks, communicati	or fault detection an ue, structure of digi on protocols.	d fault correction, information tal transmission systems, intro-
Intende	ed leari	ning outcomes			
The stu transmi	dents <sub>l</sub> ission,	possess a technical, theo a knowledge that is nece	retical and practical l ssary to understand	knowledge of the str these systems.	ructure of systems for information
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (n	io infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)
Method module is	l of ass creditab	s <b>essment</b> (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
tion dat aminati tion of o examin	te, the ion in g one car ation in	written examination can groups. A 80 to 90 minute ndidate each, a 30 minut n groups of 3.	be replaced by an ora written examination e (approx.) oral exam	al examination of on is equivalent to a 24 ination in groups of	e candidate each or an oral ex- o minute (approx.) oral examina- 2 and a 40 minute (approx.) oral
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
§ 69 (1)	1. c) lr	nformatik Technische Info	ormatik		
Module	appea	nrs in			
Bacheld Bacheld Bacheld Bacheld Bacheld Bacheld First sta	Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) First state examination for the teaching degree Gymnasium Computer Science (2009)				

	e title				Abbreviation
Theore	tical in	formatics			10-l-Tl-102-m01
Module coordinator				Module offered by	
Dean o	f Studi	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis announced by the le	site to assessment: e	exercises (type and scope to be ing of the course).
Conten	ts				
Compu mata a	tability nd regu	, decidability, countabilit ılar sets, generative gram	ty, complexity of calcumates, context-free la	ulations, Boolean fu nguages, context-se	nctions and circuits, finite auto- nsitive languages.
Intend	ed lear	ning outcomes			
The stu tability gramm	idents   , comp ars, co	possess fundamental and lexity of calculations, Boo ntext free languages, con	d applicable knowled blean functions and c text sensitive langua	ge in the area of con ircuits, finite automa ges.	nputability, decidability, coun- ata and regular sets, generative
Course	<b>S</b> (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (I	no infoi	mation on SWS (weekly o	contact hours) and co	urse language avail	able)
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) written examination (approx. 80 to 90 minutes). If announced by the lecturer by four weeks prior to the examination date, the written examination can be replaced by an oral examination of one candidate each or an oral examination in groups. A 80 to 90 minute written examination is equivalent to a 20 minute (approx.) oral examination of one candidate each, a 30 minute (approx.) oral examination in groups of 2 and a 40 minute (approx.) oral examination in groups of 3.					
Allocal					
 Additia	nalinf	ormation			
Additio					
Workla	be				
WORKIG	au				
Teachi		۵			
	is cyce	<u> </u>			
Referre	d to in	<b>IPOI</b> (examination regulations	for teaching degree progra	mmec)	
§ 49 (1) § 69 (1	) 1. a) lr ) 1. a) lr	nformatik Theoretische In nformatik Theoretische In	formatik, Algorithme formatik, Algorithme	n und Datenstruktur n und Datenstruktur	en en
Module	e appea	in a state of the			
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) First state examination for the teaching degree Realschule Computer Science (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)					

Module	e title				Abbreviation
Logic for informatics 10-I-LOG-102-m01			10-l-LOG-102-m01		
Module	e coord	inator		Module offered by	
Dean o	f Studi	es Informatik (Computer	Science)	Institute of Comput	er Science
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis announced by the le	site to assessment: e ecturer at the beginn	exercises (type and scope to be ing of the course).
Conten	ts				
Syntax nite for	and se mula s	mantics of propositional ets, syntax and semantic	logic, equivalence ar s of predicate logic.	nd normal forms, Ho	rn formulas, SAT, resolution, infi-
Intende	ed lear	ning outcomes			
The stu normal	dents a forms,	are proficient in the follov Horn formulas, SAT, reso	wing areas: syntax an plution, infinite formu	d semantics of prop Ila sets, syntax and s	ositional logic, equivalence and semantics of predicate logic.
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method module is	<b>d of ass</b> creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
written tion da aminat	examin te, the ion in g	nation (approx. 50 to 60 m written examination can groups (one candidate ea	minutes); if announce be replaced by an ora ch: 15 minutes, group	ed by the lecturer by al examination of on os of 2: 20 minutes,	four weeks prior to the examina- e candidate each or an oral ex- groups of 3: 25 minutes)
Allocat	ion of <sub>l</sub>	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Computer S	cience (2010)		
Bachel	or' deg	ree (1 major) Mathematic	5 (2012)		
Bachel	or' deg	ree (1 major) Mathematic	S (2013) nal Mathematics (ac	12)	
Bachel	or deg or deg	ree (1 major) Computatio	nal Mathematics (20)	12)	
First sta	ate exa	mination for the teaching	g degree Gymnasium	Computer Science (2	2009)

Module title				Abbreviation		
Databases 10-I-DB-102-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade		• • • •		
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequi	site to assessment: ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	Its	<u>I</u>	· · ·	5		
Relatio ment.	nal alg	ebra and complex SQL	statements; database	planning and norma	l forms; transaction	manage-
Intend	ed lear	ning outcomes				
The stu	udents	possess knowledge abo	out database modellin	g and queries in SQL	as well as transacti	ons.
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (ı	no info	rmation on SWS (weekly	, contact hours) and co	ourse language avail	able)	
Metho	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
module is	s creditab	le for bonus)				
if anno ced by nutes, Langua	exami unced an oral groups age of a	nation (approx. 50 to 60 by the lecturer by four v l examination of one ca of 2: 20 minutes, group ssessment: German, Er	o minutes) veeks prior to the exan ndidate each or an ora os of 3: 25 minutes) nglish if agreed upon v	nination date, the wr l examination in grou vith the examiner	itten examination ca ups (one candidate e	n be repla- each: 15 mi-
Allocat	ion of <sub>l</sub>	places				
Additio	onal inf	ormation				
Worklo	ad					
	1					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
§ 49 (1) § 69 (1)	) 1. b) [ ) 1. b) [	Oatenbanksysteme und Datenbanksysteme und	Softwaretechnologie Softwaretechnologie			
Module	e appea	ars in				
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Business Information Systems (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor' degree (1 major) Functional Materials (2012) Master's degree (1 major) Computer Science (2010) Master's degree (1 major) Mathematics (2012)						
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • g cord Bachelor (18	enerated 26-Aug-2024 • exan o ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 103 / 153



Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Computational Mathematics (2012) First state examination for the teaching degree Realschule Computer Science (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title				Abbreviation		
Object-oriented Programming         10-I-OOP-102-m01						
Module	e coord	inator		Module offered by		
Dean of Studies Informatik (Computer Science) Institute of Computer Science			er Science			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	undergraduate	Admission prerequi announced by the le	site to assessment: ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	ts					
Polymo ment.	rphism	, generic programming	, meta programming, v	veb programming, te	mplates, document	manage-
Intende	ed learı	ning outcomes				
The stu their pr	dents a actical	are proficient in the diff use.	erent paradigms of ob	ject-oriented prograr	nming and have exp	erience in
Course	<b>S</b> (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Methoo module is	<b>l of ass</b> creditab	s <b>essment</b> (type, scope, langu le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
tion dat aminati Langua	te, the ion in g ge of a ion of p	written examination cal groups (one candidate e ssessment: German, Er <b>blaces</b>	n be replaced by an or each: 15 minutes, grou glish if agreed upon w	al examination of on ps of 2: 20 minutes, vith the examiner	e candidate each or groups of 3: 25 minu	an oral ex- ites)
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	9				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	ammes)		
Module	e appea	rs in				
Bachel	or' deg	ree (1 major) Computer	Science (2010)			
Bachel	or' deg	ree (1 major) Mathemat	ics (2012)			
Bachel	or' deg	ree (1 major) Mathemat	ics (2013)	,		
Bachel	or' deg	ree (1 major) Business I	nformation Systems (2	2013)		
Bachel	or' degi	ree (1 major) Computati	onal Mathematics (20	12)		
Bachel	or deg	ree (1 major) Computati	Computer Science (20	13)		
Bachel	or' deg	ree (1 major) Aerospace	Computer Science (20	) (9) (11)		
Master'	's degr	ee (1 major) Computer S	computer science (20 Science (2010)	511)		
Master	's degr	ee (1 major) Physics (20	10)			
Master	's degr	ee (1 major) Physics (20	11)			
Master	's degr	ee (1 major) Nanostruct	ure Technology (2011)			
Bachelor's (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg ● g cord Bachelor (18	enerated 26-Aug-2024 • exan o ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 105 / 153



Master's degree (1 major) Nanostructure Technology (2010)

Module title				Abbreviation		
Theory of Complexity     10-I-KT-102-m01						
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
	nume	rical grade				
Duratio	n	Module level	Other prerequisites	2		
	stor	undorgraduato	Admission proroqui	isito to accossmont.	overcices (type and	scopo to bo
1 Seme			announced by the l	ecturer at the beginn	ing of the course).	
Conten	ts					
Comple sumpti thods,	exity m on vers P-NP p	easurements and classe sus computation time, d roblem, completeness p	es, general relationshi eterminism versus inc problems, Turing reduc	ps between space ar determinism, hierarc ction, interactive pro	nd time classes, mer hical theorems, trans of systems.	nory con- slation me-
Intend	ed lear	ning outcomes				
The stu classes determ proble	ıdents 5, gene iinism v ms, Tur	possess a fundamental ral relationships betwee versus indeterminism, h ing reduction, interactiv	and applicable knowl in space and time clas ierarchical theorems, ie proof systems.	edge in the areas of sses, memory consur translation methods	complexity measure nption versus comp , P-NP problem, com	ments and utation time, pleteness
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (I	no info	rmation on SWS (weekly	contact hours) and c	ourse language avail	able)	
Metho module is	<b>d of ass</b> s creditab	<b>Sessment</b> (type, scope, langu Ile for bonus)	age — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
written tion da aminat Langua	exami te, the ion in g age of a	nation (approx. 50 to 6c written examination car groups (one candidate e ssessment: German, En	minutes); if announc be replaced by an or ach: 15 minutes, grou glish if agreed upon v	ed by the lecturer by al examination of on ps of 2: 20 minutes, vith the examiner	four weeks prior to t e candidate each or groups of 3: 25 minu	the examina- an oral ex- ites)
Allocat	ion of <sub>l</sub>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi			_			
Teacini	ing cycl	C				
Deferme						
Referre		<b>LPUI</b> (examination regulation	ns for teaching-degree progra	ammes)		
Module	e appea	ars in	<b></b>			
Bachel	or' deg	ree (1 major) Computer	Science (2010)			
Bachel	Bachelor' degree (1 major) Mathematics (2012)					
Bachel	Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012)					
Bachel	or' deg	ree (1 major) Computati	onal Mathematics (20	13)		
Bachel	or' deg	ree (1 major) Aerospace	Computer Science (2	009)		
Bachel	or' deg	ree (1 major) Aerospace	Computer Science (2	011)		
Master	's degr	ee (1 major) Computer S	cience (2010)			
Master	's degr	ee (1 major) Mathematio	cs (2012)			
Bachelor's	with 1 ma	ior Computational Mathematics	IMU Würzhurg ● g	enerated 26-Aug-2024 • exam	n. reg. data re-	page 107 / 153
(2012)			cord Bachelor (18	o ECTS) Computational Mathe	ematics - 2012	Page 10/ / 100



Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Computational Mathematics (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)
Module title					Abbreviation		
Automation and Control Technology					10-I-AR-102-m01		
Module	e coord	inator		Module offered by			
holder	ofthe	Chair of Computer Scie	nce VII	Institute of Comput	er Science		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
8	nume	rical grade		, ,,			
Duratic	n	Madula laval	Other prorequisites				
Duratit				•• •	• 4		
1 Seme	ster	undergraduate	announced by the le	ecturer at the beginn	ing of the course).		
Conten	ts						
Overvie functio structu nes, co cess sy	ew of a n, plan re of Pe mmun nchror	utomation systems, fur it, controller types, bas etri nets, Petri nets for a ication between proces nisation, process comm	ndamental principles of ic feedback loop, funda automisation, machine is computers and perip junication, real-time op	control technology, amental principles of related structure of hery devices, softwa erating systems, rea	Laplace transformat f control engineering processing computa the for automation sy ll-time planning.	ion, transfer , automata, tion machi- stems, pro-	
Intende	ed lear	ning outcomes					
The stu	idents	master the fundamenta	lls of automation and c	ontrol.			
Course	S (type, r	number of weekly contact hour	s, language — if other than Ger	rman)			
	no info	rmation on SWS (week)	v contact hours) and co	urse language avail	able)		
Metho module is	<b>d of ass</b> s creditab	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, informati	ion on whether	
tion da aminat tion of examin Langua	te, the ion in some can nation i nage of a	written examination ca groups. A 80 to 90 minu ndidate each, a 30 minu n groups of 3.	n be replaced by an ora ute written examinatior ute (approx.) oral exam	al examination of on i is equivalent to a 2 nination in groups of with the examiner	e candidate each or o minute (approx.) o 2 and a 40 minute (a	an oral ex- ral examina- approx.) oral	
Allocat	ion of	places					
Additio	nal inf	ormation					
Worklo	ad						
WOIKIU	au						
Teachi	ng cycl	e					
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progra	immes)			
Module appears in							
Bachelor' degree (1 major) Computer Science (2010)							
Bachelor' degree (1 major) Mathematics (2012)							
Bachelor' degree (1 major) Mathematics (2013)							
Bachelor' degree (1 major) Computational Mathematics (2012)							
Bachelor' degree (1 major) Computational Mathematics (2013)							
Bachelor' degree (1 major) Aerospace Computer Science (2009)							
Bachel	Bachelor' degree (1 major) Aerospace Computer Science (2011)						
Master	Master's degree (1 major) Computer Science (2010)						
Master	S degr	ee (1 major) Mathemati	CS (2012)	enerated 26-Aug-2024 • even	n reg data re-	nage 100 / 152	
(2012)	with 1 lind		cord Bachelor (180	ECTS) Computational Mathe	ematics - 2012	page 109 / 153	

#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Computational Mathematics (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)

Module title				Abbreviation		
Compu	Computer Architecture 10-I-RAK-102-m01					
Module coordinator				Module offered by		
Dean o	f Studi	es Informatik (Compute	r Science)	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on .	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequi announced by the le	site to assessment: e ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	ts					
Instruc ling, ca	tion se iches, v	t architectures, comma vector processors, multi	nd processing through -core processors.	pipelining, statical a	and dynamic instruct	tion schedu-
Intende	ed lear	ning outcomes				
The stu compile	idents ers anc	master the most import I operating systems.	ant techniques to desi	gn fast computers as	s well as their interac	ction with
Course	<b>S</b> (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (r	no infoi	mation on SWS (weekly	/ contact hours) and co	ourse language avail	able)	
Methoo module is	<b>d of ass</b> s creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
written tion da aminat Langua	examin te, the ion in g ige of a	nation (approx. 50 to 60 written examination ca groups (one candidate e ssessment: German, Er	o minutes); if announc n be replaced by an or each: 15 minutes, grou nglish if agreed upon w	ed by the lecturer by al examination of on ps of 2: 20 minutes, vith the examiner	four weeks prior to t e candidate each or groups of 3: 25 minu	the examina- an oral ex- ites)
Allocat	ion of <b>j</b>	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ummes)		
§ 69 (1)	) 1. c) Ir	nformatik Technische In	formatik			
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Computer	Science (2010)			
Bachel	or' deg	ree (1 major) Mathemat	ics (2012)			
Bachelor' degree (1 major) Mathematics (2013)						
Bachelor' degree (1 major) Computational Mathematics (2012)						
Dachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2000)						
Bachelor' degree (1 major) Aerospace Computer Science (2009)						
Master	Dachelor degree (1 major) Aerospace Computer Science (2011)					
Master's degree (1 major) Computer Science (2010) Master's degree (1 major) Mathematics (2012)						
Master	Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010)					
Master	Master's degree (1 major) Muticinatics (2010) Master's degree (1 major) Physics (2010)					
Master's degree (1 major) Physics (2010)						
Bacholore	with a mo	ior Computational Mathematical	IMIT W/Brahuma a	anerated of Aug and a aver	n reg data ro	D300 111 / 150
(2012)	with 1 lind		cord Bachelor (18)	p ECTS) Computational Mathe	matics - 2012	page 111 / 153

Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation		
Computer Networks and Communication Systems					10-I-RK-102-m01	
Module coordinator				Module offered by		
holder	of the (	Chair of Computer Scier	ice III	Institute of Comput	er Science	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate	Admission prerequi announced by the le	site to assessment: ecturer at the beginn	exercises (type and s ing of the course).	scope to be
Conten	ts					
Propert of com and str chies, o and ISO Mobile works.	ties of c puter n ructure dataflor D archit comm	computer and communi etworks and communic of computer networks: w control and traffic cor secture models. Internet unication networks: fun	cation systems: data t ation systems: problem network structure, net ntrol, transfer network. t: structure and basic r damental concepts, G	raffic in distributed s m statement and intr work access, access Communication pro nechanism, TCP/IP, SM, UMTS. Future co	systems. Performanc oduction to method methods, digital tran tocols: fundamental routing, network man mmunication system	e analysis architecture nsfer hierar- principles nagement. ns and net-
Intende	ed lear	ning outcomes				
The stu as well	idents j as fun	possess an intricate kno damental principles to	owledge of the structu rate these systems.	re of computer netwo	orks and communica	tion systems
Course	<b>S</b> (type, r	umber of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (r	no infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Metho	d of ass	sessment (type, scope, lang	uage — if other than German.	examination offered — if no	t every semester, informati	ion on whether
module is	s creditab	le for bonus)	, age in other than oonnan,			
written tion da aminat tion of examin Langua	examin te, the ion in g one can ation in age of a	nation (approx. 80 to 90 written examination ca groups. A 80 to 90 minu ndidate each, a 30 minu n groups of 3. ssessment: German, Er	o minutes). If announc n be replaced by an or te written examinatior ute (approx.) oral exan nglish if agreed upon w	ed by the lecturer by al examination of on n is equivalent to a 2 nination in groups of vith the examiner	four weeks prior to t e candidate each or o minute (approx.) o 2 and a 40 minute (a	:he examina- an oral ex- ral examina- approx.) oral
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module	e appea	urs in				
Bachelor' degree (1 major) Computer Science (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor's with 1 major Computational Mathematics JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-						
(2012)			cord Bachelor (18)	o ECTS) Computational Mathe	ematics - 2012	

#### Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Computer Science (2010) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Computational Mathematics (2012) First state examination for the teaching degree Gymnasium Computer Science (2009)



## Application-oriented Subject Physics

(ECTS credits)



# **Application-oriented Subject Physics Compulsory Electives 1: Basics** (ECTS credits)

Module title					Abbreviation	
Introduction to Physics Part 1 for students of Physics Related Minor Se					11-ENNF1-062-m01	
Module coordinator				Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
7	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Mechar	nics, vil	bration theory, thermody	namics.			
Intende	d lear	ning outcomes				
The stu	dents k	have basic knowledge of	nhysics for engineeri	ng students		
Course			physics for engineen			
Courses	S (type, n	umber of weekly contact hours, l	anguage — If other than Ger	man)	11.5	
V + U (r	infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Methoo module is	l of ass creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
written	examir	nation (approx. 120 minu	tes)			
Allocat	ion of p	olaces				
Only as	part o	f pool of general key skill	s (ASQ): 20 places. P	laces will be allocate	ed by lot.	
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	۹				
	15 0 9 00	-				
Poforro	d to in	IDO I (avamination regulation)	for tooching dogroe progra	mmac)		
Referre		LFUI (examination regulations	s for teaching-degree progra	mmes)		
Madula		ve in				
Module	appea		( 0)			
Bachelo	or' degi	ree (1 major) Mathematic	s (2008)			
Bachel	or degi	ree (1 major) Mathematic	S (2014)			
Dachel	Ji uegi	ree (1 major) Mathematic	S (2012)			
Dachel	Ji uegi	ree (1 major) Mathematic	S(2013)			
Bachel	or degi	ree (1 major) Mathematic	s (2007) of Eurotional Matoria			
Bachel	Ji uegi ar' dagi	ree (1 major) Technology	of Functional Materia	lls (2009)		
Bachelori degree (1 major) rechnology of Functional Materials (2010)						
Dachelor degree (1 major) computational Mathematics (2009)						
Dachelor degree (1 major) Computational Mathematics (2014)						
Bachel	Dachelor degree (1 major) Computational Mathematics (2012)					
Bachal	Dachelori degree (1 major) Computational Mathematics (2013)					
Dachel	Dachelor degree (1 major) Aerospace Computer Science (2009)					
Dachel	Sacrietor degree (1 major) Aerospace Computer Science (2014)					
Bachel	uegi Ji degi	ree (1 major) Aerospace (	Lomputer Science (20 Astorials (2010)	)11)		
Bachel	uegi	ree (1 major) Functional N	of Functional Materia			
Bachelor <sup>-</sup> degree (1 major) Technology of Functional Materials (2006)						

Bachelor's with 1 major Computational Mathematics	
(2012)	

Module title					Abbreviation	
Introduction to Physics Part 2 for students of Physics Related Minor Subjects					11-ENNF2-062-m01	
Module	e coordi	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
7	numei	rical grade		-		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts		<u> </u>			
Science	e of ele	ctricity, magnetism, optic	cs, Atomic Physics.			
Intende	ed learr	ning outcomes				
The stu	dents ł	nave basic knowledge of	physics for engineeri	ng students.		
Courses	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	l of ass	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
written	examir	nation (approx, 120 minu	tes)			
Allocat	ion of p	olaces				
Only as	part of	f pool of general key skill	s (ASQ): 20 places. P	laces will be allocate	ed by lot.	
Additio	nal info	ormation			· ·	
Worklo	ad					
Teachir	ng cycl	9				
	<u> </u>					
Referre	d to in	<b>LPO I</b> (examination regulation)	s for teaching-degree progra	mmes)		
Module	appea	rs in				
Bachelo	or' degi	ree (1 major) Mathematic	s (2008)			
Bachelo	or' degi	ree (1 major) Mathematic	s (2014)			
Bachelo	or' degi	ree (1 major) Mathematic	s (2012)			
Bachelo	or' degi	ree (1 major) Mathematic	s (2013)			
Bachelo	or' degi	ree (1 major) Mathematic	s (2007)			
Bachelo	or' degi	ree (1 major) Technology	of Functional Materia	ls (2009)		
Bachelo	Bachelor' degree (1 major) Technology of Functional Materials (2010)					
Bachelor' degree (1 major) Computational Mathematics (2009)						
Bachelo	Bachelor' degree (1 major) Computational Mathematics (2014)					
Bachelo	or' degi	ree (1 major) Computatio	nal Mathematics (201	12)		
Bachelo	Bachelor' degree (1 major) Computational Mathematics (2013)					
Bachelo	Bachelor' degree (1 major) Aerospace Computer Science (2009)					
Bachelo	Bachelor' degree (1 major) Aerospace Computer Science (2014)					
Bachelo	Bachelor' degree (1 major) Aerospace Computer Science (2011)					
Bachelo	or' degi	ree (1 major) Functional N	Naterials (2012)			
Bachelo	or' degi	ree (1 major) Technology	of Functional Materia	ls (2006)		

Module title					Abbreviation		
Classic	Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electrici- 11-KP-092-m01						
ty, Magnetism and Optics)							
Module	coord	inator		Module offered by			
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
16	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
2 seme	ster	undergraduate	Bridge course Mathe cal Methods of Phys	ematische Rechenme ics) for first-semeste	ethoden der Physik ( er students.	(Mathemati-	
Conten	ts						
Physica gnetic v tion. Int Non-lin rent. Ma ternatir	al laws vibratio teractio earity a echani ng curre	of mechanics, thermodyr ons and waves, radiation ons and central forces. Ge and chaos. Mechanics of sms of conduction. Magn ent. Electromagnetic wave	namics, vibrations, w and wave optics. Tim eneral relativity. Mecl non-rigid bodies. Gas netostatics. Electroma es. Geometric optics.	aves, science of elec e, room and motion. nanics of rigid bodies sses. Thermodynami agnetic induction. Ma Wave optics.	tricity, magnetism, e Physical values. Fo s. Friction. Vibration cs. Electrostatics. El axwell equations. So	electroma- rce and mo- and waves. lectric cur- cience of al-	
Intende	ed leari	ning outcomes					
The stu ves, sci are able knowle	dents ( ence o e to ap dge to	understand the basic prir f electricity, magnetism, ply mathematical methoo the solution of mathema	nciples and connection electromagnetic vibra ds to the formulation tical-physical tasks.	ons of mechanics, the ations and waves, ra of physical contexts	ermodynamics, vibra diation and wave op and autonomously a	ations, wa- otics. They apply their	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
Klassis tact ho Klassis contact	che Ph urs) + Ü che Ph : hours)	ysik 1 (Mechanik, Wellen J (2 weekly contact hours ysik 2 (Elektromagnetism ) + Ü (2 weekly contact ho	, Wärme) (Classical P 5), once a year (winter 1us, Optik) (Classical 5urs), once a year (su	hysics 1 (Mechanics, <sup>•</sup> semester) Physics 2 (Electroma mmer semester)	, Waves, Heat)): V (4 agnetism, Optics)): V	weekly con- / (4 weekly	
Methoo module is	l of ass creditab	<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, informati	ion on whether	
<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Klassische Physik 1 (Classical Physics 1)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Klassische Physik 2 (Classical Physics 2)): written examination (approx. 120 minutes).</li> <li>3. 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 (approx. 120 minutes).</li> </ul>							
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Klassische Physik 1 (Classical Physics 1) and Klassi- sche Physik 2 (Classical Physics 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.							
Allocation of places							
Bachelor's (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	nerated 26-Aug-2024 • exam ECTS) Computational Mathe	n. reg. data re- matics - 2012	page 119 / 153	

Additional information				
Workload				
Teaching cycle				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)				
Module appears in				
Bachelor' degree (1 major) Mathematics (2012)				
Bachelor' degree (1 major) Mathematics (2013)				
Bachelor' degree (1 major) Physics (2010)				
Bachelor' degree (1 major) Physics (2012)				
Bachelor' degree (1 major) Nanostructure Technology (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2012)				
Bachelor' degree (1 major) Mathematical Physics (2009)				
Bachelor' degree (1 major) Mathematical Physics (2012)				
Bachelor' degree (1 major) Computational Mathematics (2012)				
Bachelor' degree (1 major) Computational Mathematics (2013)				
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)				
No final examination Special study offering (2010)				



## Application-oriented Subject Physics Compulsory Electives 2: Lab Course

(ECTS credits)

Exactly one of the two modules 11-P-PA Physikalisches Praktikum Teil A (Physics Practical Course A) and 11-PNNF Physikalisches Praktikum für Studierende eines physiknahen Nebenfachs (Physics Practical Course for Students of Physics-related Minors) must be taken; students are not permitted to take both of these modules.

Module title					Abbreviation	
Physics Laboratory Course for students of Physics Related Minor Subjects				Minor Subjects	11-PNNF-062-m01	
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
3	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Mechar Physics	nics, vi 5.	bration theory, thermody	namics, optics, X-ray	s, nuclear magnetic	resonance, Atomic and Nuclear	
Intende	ed leari	ning outcomes				
The stu	dents l	know the principles of Ph	ysics.			
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
P (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available	e)	
Method	l of ass	<b>essment</b> (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
module is	creditab	le for bonus)				
a) oral t	test (ap	pprox. 15 minutes) during	experiment and b) u	ngraded written exa	mination (approx. 90 minutes)	
Allocat	ion of p	olaces				
Only as	part o	f pool of general key skill	s (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	ins in				
Bachelo	or' deg	ree (1 major) Mathematic	s (2008)			
Bachelo	or' deg	ree (1 major) Mathematic	s (2014)			
Bachelo	or' deg	ree (1 major) Mathematic	s (2012)			
Bachel	Bachelor' degree (1 major) Mathematics (2013)					
Bachelor' degree (1 major) Mathematics (2007) Bachelor' degree (1 major) Technology of Functional Materials (2000)						
Bachelor' degree (1 major) Technology of Functional Materials (2009)						
Bachelo	or' deg	ree (1 major) Computation	nal Mathematics (20)	09)		
Bachelo	Bachelor' degree (1 major) Computational Mathematics (2014)					
Bachelo	Bachelor' degree (1 major) Computational Mathematics (2012)					
Bachelo	or' deg	ree (1 major) Computatio	nal Mathematics (20	13)		
Bachelo	or' deg	ree (1 major) Functional N	Naterials (2012)			
Bachelo	or' deg	ree (1 major) Technology	of Functional Materia	als (2006)		

Module title				Abbreviation	
Lab Course A					11-P-PA-112-m01
Module	e coord	inator		Module offered by	
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Physica pagatic tests, w	al laws on, grap vriting o	of mechanics, thermodyr ohs, linear regression, av of lab reports and publica	namics, science of ele erage values and stan ations	ectricity, types of erronder of erronde Indard deviation, dist	or, error approximation and pro- tribution functions, significance
Intende	ed leari	ning outcomes			
The stu le to ind measui princip	dents l depenc ring pro les of s	know and have mastered lently plan and conduct e otocol. They are able to ev tatistics and to draw, pre	physical measuring experiments, to cooperation valuate the measuring esent and discuss the	nethods and experinerate with others, an gresults on the basi conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Auswer Ü (1 we Beispie BAM): F	tung vo ekly co ele aus P (2 we	on Messungen und Fehle ntact hour), once a year Mechanik, Wärmelehre u ekly contact hours)	rrechnung (Measurer (winter semester) Ind Elektrik (Example	nents and Data Anal s from Mechanics, T	ysis): V (1 weekly contact hour) + hermodynamics and Electricity,
Method	d of ass	<b>sessment</b> (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
1. Topic 2. Lab c ted if lated	odule h cs cove course: f a Test l contei	as the following assessm red in lectures and exerc a) Preparing, performing at (exam) is passed. b) Ta nts of the course (approx	nent components ises: written examina and evaluating the e alk (with discussion) . 30 minutes).	tion (approx. 120 m xperiments will be c to test the students'	inutes) onsidered successfully comple- understanding of the physics-re-
Succes	sful co	mpletion of approx. 50%	of practice work is a	prerequisite for adm	ission to assessment component
<ol> <li>To pass assessment component 2, students must pass both elements a) and b). Students will be offered one opportunity to retake element a) and/or element b).</li> <li>Students must register for assessment components 1 and 2 online (details to be announced).</li> <li>Students must attend Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis) befo-</li> </ol>					
Electric	ity).	cispicie dus meenanik, v			vicenames, mennoaynamies ana
To pass	s this m	iodule, students must pa	ss both assessment	component 1 and as	sessment component 2.
Allocation of places					
Additional information					
Workload					
Teachi	Teaching cycle				

Referred to in LPO	(examination	n regulations f	for teaching-degree progra	ammes)
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- § 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie
- § 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) 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)

Module title				Abbreviation		
Basic Practical Course B (Minor Studies)					11-P-NFB-122-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
4	(not) s	successfully completed	11-P-PA			
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Physica	al laws	of optics, vibrations and	waves, science of ele	ectricity and circuits	with electric components.	
Intende	ed leari	ning outcomes				
The stu le to inc measur princip	dents l depenc ring pro les of s	know and have mastered lently plan and conduct e ptocol. They are able to ev tatistics and to draw, pre	physical measuring experiments, to coop valuate the measurin sent and discuss the	methods and experin erate with others, an g results on the basi conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
P (no in	Iformat	ion on SWS (weekly cont	act hours) and cours	e language available	e)	
Methoo module is	<b>d of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) Preparing if a Test (with di the move the ass	aring, p tat (exa iscussi dule co essme	performing and evaluatin am) is passed. Experimer on; approx. 30 minutes) omponent. Talks that wer nt have to be successfull	g (lab report) the exp its that were not succ to test the candidate e not successfully co v completed.	eriments will be con essfully completed o 's understanding of t mpleted can be repe	sidered successfully completed can be repeated once. And b) talk he physics-related contents of ated once. Both components of	
Allocat	ion of p	olaces	/			
Additio	nal inf	ormation				
Additio	nal info	ormation on module dura	tion: 1 to 2 semester	S.		
Worklo	ad					
Teachir	ng cycl	e				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelo Bachelo	or' deg or' deg	ree (1 major) Mathematic ree (1 major) Mathematic	s (2014) s (2012)			
Bachel	Bachelor' degree (1 major) Mathematics (2013)					
Bachel	or' deg	ree (1 major) Computatio	nal Mathematics (20)	14)		
Bachel	or' deg or' deg	ree (1 major) Computatio	nal Mathematics (20)	12)		
Dachell	Dachelor Gegree (1 major) Computational Mathematics (2013)					



## **Application-oriented Subject Physics Compulsory Electives 3**

(ECTS credits)

Out of several module components covering the same contents, students may only use one each. This means that the following combinations are not permitted:

- 11-KM may neither be combined with 11-QAM nor with 11-FKP.

- 11-STE may neither be combined with 11-ST nor with 11-ED.

- 11-TQM may neither be combined with 11-TM nor with 11-QM.

Module title				Abbreviation		
Conder	ised Ma	atter (Quanta, Atoms, Mo	olecules, Solid State	Physics)	11-KM-092-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate				
Conten	ts	0	Į			
Quantu Quantu Atoms mical b (FEG). ( propert	im phe im Phys in exter onding Crystal ies of i	nomena, introduction to sics. Mathematical formu mal fields. Many-electror Molecule rotations and structure. The reciprocal nsulators. Electrons in a	Atomic Physics and p lation of quantum mo atoms. Optical trans vibrations. Bonding lattice. Structure dete periodic potential.	ohysical laws of solic echanics. Quantum sitions and spectroso in crystals. Mechani ermination. Lattice v	ls. Experimental principles of mechanics of hydrogen atoms. copy. Laser. Molecules and che- cal properties. Free electron gas ibrations (phonons). Thermal	
Intende	ed leari	ning outcomes	· · ·			
The stu ding ar They ar apply t	dents l Id struc e able heir kn	know the basic contexts a ture, lattice dynamics, th to apply mathematical m owledge to the solution o	and principles of qua nermal properties, pri ethods to the formula of mathematical-phys	ntum phenomena, A nciples of electronic ation of modern phy ical tasks.	tomic Physics and solids (bon- properties (free electron gas)). sical contexts and autonomously	
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
Konder kly con Konder hours)	tact ho sierte + Ü (2 v d of ass	Materie 1 (Quanten, Aton urs) + Ü (2 weekly contac Materie 2 (Festkörperphy veekly contact hours), or <b>sessment</b> (type, scope, langua	ne, Molekule) (Conde t hours), once a year rsik 1) (Condensed Ma nce a year (summer so ge — if other than German, o	nsed Matter 1 (Quan (winter semester) atter 2 (Solid State P emester) examination offered — if no	ita, Atoms, Molecules)): V (4 wee- Physics)): V (4 weekly contact ot every semester, information on whether	
module is	creditab	le for bonus)				
This mo 1. Topio amin 2. Topio amin 3. Topio minu	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Kondensierte Materie 1 (Condensed Matter 1)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Kondensierte Materie 2 (Condensed Matter 2)): written examination (approx. 120 minutes).</li> <li>3. 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 (approx. 120 minutes).</li> </ul>					
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Kondensierte Materie 1 (Condensed Matter 1) and Kondensierte Materie 2 (Condensed Matter 2). The topics discussed in these two courses will be covered in as- sessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Allocat	ion of p	olaces				

Additional information
Workload
Teaching cycle
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title				Abbreviation		
Statisti	cal Me	chanics, Thermodynami	cs and Electrodynami	ics	11-STE-092-m01	
Module	coord	inator		Module offered by		
Managing Director of the Institute of Theoretical Physic and Astrophysics			heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	10-M1-PHY and 10-N	12-PHY or 10-M1-NST	and 10-M2-NST	
Conten	ts					
Principl ticles, c namics	es of S ritical of elec	tatistical Physics: Ideal phenomena, Maxwell ec tromagnetic fields. Spec	systems. Thermodyna Juations, electrostatic cial relativity.	mics: Quantum stat s, magnetostatics, N	istics, systems of int Naxwell equations in	eracting par- matter, dy-
Intende	d learr	ning outcomes	-			
The stu trodyna method	dents ł mics, t s and a	nave advanced knowled; hermodynamics and sta are able to independent	ge of the methods of <sup>-</sup> itistical mechanics. Th ly apply them to the d	Theoretical Physics. They are familiar with escription and solut	They know the princi the corresponding c ion of problems in th	iples of elec- alculation nis area.
Courses	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
Statistis hours) - Theoret hours),	sche M + Ü (2 v ische E once a	echanik und Thermodyr veekly contact hours), o Elektrodynamik (Theoret year (summer semester	amik (Statistical Mec nce a year (winter sen ical Electrodynamics) )	hanics and Thermod nester) : V (4 weekly contact	ynamics): V (4 week hours) + Ü (2 weekl	ly contact y contact
Method	of ass	essment (type, scope, langu	age — if other than German, o	examination offered — if no	t every semester, informati	ion on whether
module is	creditab	le for bonus)				
<ol> <li>This module has the following assessment components</li> <li>Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes).</li> <li>Topics covered in lectures and exercises in part 2 (Theoretische Elektrodynamik (Theoretical Electrodynamics)): written examination (approx. 120 minutes).</li> <li>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 (approx. 120 minutes).</li> </ol>					atistical Me- rodyna- (approx. 30	
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. Students are highly recommended to attend both courses Statistische Mechanik und Thermodynamik (Statisti- cal Mechanics and Thermodynamics) and Theoretische Elektrodynamik (Theoretical Electrodynamics). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Allocati	on of p	olaces				
Additional information						
Worklo	ad					
Bachelor's v (2012)	vith 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam DECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 129 / 153

## Teaching cycle

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

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## Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

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

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

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title				Abbreviation	
Theoret	Theoretical Mechanics and Quantum Mechanics				11-TQM-092-m01
Module	e coord	inator		Module offered by	
Managi and Ast	ing Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
16	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	undergraduate	10-M1-PHY, 10-M2-P	PHY and 11-MPI-3 or 1	o-M1-NST, 10-M2-NST and MPI-3
Conten	ts				
Newton Problen Limits c cillator. ny-parti	iian me ns of ce of class . Angula icle sys	echanics. Lagrangian and entral forces, minor vibra ical physics. Schrödinge ar momentum and spin. I stems.	Hamiltonian formali tions, rigid body, mo r equation, mathema Hydrogen atom. Meth	sm. Symmetries and tion in electromagne tical principles of qu nods of approximatic	conservation laws. Applications: tic fields. Relativistic dynamics. tantum mechanics, harmonic os- on. Motion in electric fields. Ma-
Intende	ed learn	ning outcomes			
The stu miliar w of quan of Theo cal con	dents h vith the ntum th retical cepts.	nave gained first experien principles of theoretical eory. They are able to ap Physics and to interpret	nces concerning the v mechanics and their ply the acquired calc the results. They have	working methods of T r different formulatio ulation methods and e especially acquired	Theoretical Physics. They are fa- ns and understand the principles I techniques to simple problems I knowledge of basic mathemati-
Course	<b>S</b> (type, n	umber of weekly contact hours, l	anguage — if other than Gei	rman)	
Theoret year (w Quante (summe	tische I inter se nmech er seme	Mechanik (Theoretical Me emester) anik (Quantum Mechanio ester)	echanics): V (4 weekl cs): V (4 weekly conta	y contact hours) + Ü act hours) + Ü (2 wee	(2 weekly contact hours), once a kly contact hours), once a year
Methoo module is	<b>d of ass</b> creditab	<b>eessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	t every semester, information on whether
This mo 1. Topic amin 2. Topic tion ( 3. Topic minu	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Quantenmechanik (Quantum Mechanics)): written examination (approx. 120 minutes).</li> <li>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes).</li> </ul>				
Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik (Quantum Mechanics). The topics discussed in these two courses will be covered in as- sessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.					
Allocat	ion of p	olaces			

Additional information
Workload
Teaching cycle
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title Abbreviation				Abbreviation		
Theoret	tical El	ectrodynamics			11-ED-092-m01	
Module	coord	inator		Module offered by	Module offered by	
Managing Director of the Institute of Th and Astrophysics			neoretical Physics	eoretical Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	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 for admission to assessment anow.			
Conten	ts		l			
Principl matter	es of e	lectrostatics, magnetost	atics, Maxwell equati	ons, covariant formu	llation, electrodynan	nics and
Intende	ed learı	ning outcomes				
The stu thods.	dents l	nave knowledge of the p	rinciples of classical e	electrodynamics and	the required calcula	ation me-
Courses	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
V + Ü (n	io infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	s <b>essment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
written otherwi Assessr and will examin	examin se spe ment o l be an ation r	nation (approx. 120 minu cified) ffered: When and how of nounced in due form und egulations) 2009.	ites, for modules with ten assessment will b der observance of Sec	n less than 4 ECTS cre be offered depends o ction 32 Subsection 3	edits approx. 90 min on the method of ass 3 ASPO (general aca	utes; unless sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013)						
Bachelo	or' deg	ree (1 major) Nanostructi	ure Technology (2012)	)		
Bachelor's v (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam o ECTS) Computational Mathe	n reg. data re- matics - 2012	page 133 / 153



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title					Abbreviation	
Solid S	tate Ph	nysics 1			11-FKP-092-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 semester		undergraduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to asses	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					
Physica perties	al laws (free e	of solids: Bonding and lectron gas).	structure, lattice dyna	mics, thermal proper	ties, principles of el	ectronic pro-
Intende	ed lear	ning outcomes				
The stu therma	dents l prope	understand the basic c erties, principles of elec	ontexts and principles tronic properties (free	of solids (bonding a electron gas).	nd structure, lattice	dynamics,
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no info	rmation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	<b>d of ass</b> creditab	<b>sessment</b> (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	on on whether
written otherwi	exami ise spe ment o	nation (approx. 120 mir cified) ffered: When and how	nutes, for modules with	n less than 4 ECTS cro	edits approx. 90 min	utes; unless
and wil examin	l be an ation r	nounced in due form u egulations) 2009.	nder observance of Se	ction 32 Subsection	3 ASPO (general aca	demic and
Allocat	ion of <sub>l</sub>	olaces				
Additio	nal inf	ormation				
Worklo	ad					
 Teachir		<b>A</b>				
	ig cyci	C				
<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012)						
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • g cord Bachelor (18)	enerated 26-Aug-2024 • exan o ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 135 / 153



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title Abbreviation						
Theoret	ical M	echanics			11-TM-092-m01	
Module	coord	inator		Module offered by		
Managing Director of the Institute of Th and Astrophysics			eoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergra		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.			o as- ctive details ll be con- nt. If stu- ssment over ition for as- ill be admit- ster. For as- alification for
Content	ts					
Newton	ian me	chanics, Lagrangian and	Hamiltonian formali	sm, conservation lav	vs, limits of classica	l physics.
Intende	d learn	ning outcomes				
The stu method	dents I Is.	nave knowledge of the pr	inciples of classical t	heoretical mechanic	s and the required c	alculation
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)		
V + Ü (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
<b>Method</b> module is	<b>l of ass</b> creditab	s <b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, informati	on on whether
written otherwi Assessr and will examin	examir se spe nent o l be an ation r	nation (approx. 120 minu cified) ffered: When and how of nounced in due form unc egulations) 2009.	tes, for modules with ten assessment will b ler observance of Sec	l less than 4 ECTS cre be offered depends c ction 32 Subsection 3	edits approx. 90 min on the method of ass 3 ASPO (general aca	utes; unless sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachin	ıg cycl	e				
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
Module	appea	ars in				
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Computational Mathematics (2012)						
Bachelor's v (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam • ECTS) Computational Mathe	1. reg. data re- matics - 2012	page 137 / 153



Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title				Abbreviation	
Quanta, Ato	Quanta, Atoms, Molecules				
Module coo	rdinator		Module offered by		
Managing D	irector of the Institute of A	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS Met	hod of grading	Only after succ. con	npl. of module(s)		
8 num	erical grade				
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 for admission to assessment anew.			
Contents					
Physical law	s of Atomic, Quantum and	Molecular Physics.			
Intended lea	rning outcomes				
The student Quantum m well as mole	s have knowledge of the ba echanical atom model, one ecules: Bonding models an	asic contexts and prir e/multi-electron atom d elementary excitati	nciples of Atomic and is, electronic dipole ons: rotations, vibra	d Molecular Physics transitions, atoms ir tions, electronic exc	(atoms: 1 B field, as itations)
Courses (type	, number of weekly contact hours,	anguage — if other than Gei	rman)		
Ü + Ü (no inf	ormation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method of a module is credit	<b>ssessment</b> (type, scope, langua able for bonus)	ge — if other than German,	examination offered — if no	t every semester, informat	ion on whether
written exan otherwise sp Assessment and will be a examination	nination (approx. 120 minu pecified) offered: When and how of announced in due form und regulations) 2009.	tes, for modules with ten assessment will l der observance of Sec	n less than 4 ECTS cro oe offered depends o ction 32 Subsection ;	edits approx. 90 mir on the method of ase 3 ASPO (general aca	utes; unless sessment demic and
Allocation o	fplaces				
Additional i	nformation				
Workload					
Teaching cy	cle				
Referred to	<b>n LPO I</b> (examination regulation	s for teaching-degree progra	immes)		
Module appears in					
Bachelor' de Bachelor' de Bachelor' de Bachelor' de Bachelor's with 1 r	Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012)				
(2012)		cord Bachelor (180	ECTS) Computational Mathe	matics - 2012	



Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module	Module title				Abbreviation	
Quantu	m Mec	hanics			11-QM-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
8	nume	rical grade				
Duratio	n	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 for admission to assessment anew			
Content	ts					
Limits o oscillate	of class or, ang	ical physics, Schrödinge ular momentum and spir	r equation, mathema n, hydrogen atom, ma	tical foundations of any-particle systems	quantum mechanics	s, harmonic
Intende	d learr	ning outcomes				
The stu	dents ł	nave knowledge of the pr	inciples of quantum	mechanics and the r	equired calculation	methods.
Courses	<b>5</b> (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	<b>essment</b> (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, informat	ion on whether
written otherwi Assessr and will examina	examir se spe ment o l be an ation re	nation (approx. 120 minu cified) ffered: When and how of nounced in due form unc egulations) 2009.	tes, for modules with ten assessment will b ler observance of Sec	less than 4 ECTS cre be offered depends c ction 32 Subsection 3	edits approx. 90 min on the method of ass 3 ASPO (general aca	utes; unless sessment demic and
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachin	ig cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bacholo	appea	IFS IN	s (2012)			
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013)						
Bachelor's v (2012)	with 1 maj	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam • ECTS) Computational Mathe	n. reg. data re- matics - 2012	page 141 / 153



Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title					Abbreviation	
Statistical Mechanics and Thermodynamics 11-ST-092-m01					11-ST-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T sics	heoretical Physics	eoretical Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	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	ts					
Principl chanics	les of tl 5.	hermodynamics, fundan	nental theorems, ther	modynamic potentia	ls, principles of stati	istical me-
Intende	ed learı	ning outcomes				
The stu calculat	dents l tion me	nave knowledge of the p ethods.	rinciples of thermody	namics and statistica	al mechanics and th	e required
Courses	<b>5</b> (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
V + Ü (n	io infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	s <b>essment</b> (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
written otherwi Assessi and wil examin	examin se spe ment o l be an ation r	nation (approx. 120 minu cified) ffered: When and how o nounced in due form un egulations) 2009.	utes, for modules with ften assessment will b der observance of Sec	n less than 4 ECTS cre be offered depends o ction 32 Subsection 3	edits approx. 90 min on the method of ass 3 ASPO (general aca	utes; unless sessment demic and
Allocati	ion of p	olaces				
			-			
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2012)						
Bachelor's v	with 1 maj	or Computational Mathematics	JMU Würzburg • ge	enerated 26-Aug-2024 • exam	a. reg. data re-	page 143 / 153
(2012)			cord Bachelor (180	e ECTS) Computational Mathe	matics - 2012	



Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)
Module title					Abbreviation	
Nuclear and Elementary Particle Physics					11-KET-122-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ar			Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade		•		
Duratio	on	Module level	Other prerequisites			
1 semester		undergraduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	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					
Physical laws of Nuclear and Elementary Particle Physics. Historical introduction. Methods of Nuclear Physics. Nuclear models. Structure of nuclei. Radioactivity and spectroscopy. Nuclear energy. Radiation and matter. Acce- lerators and detectors. Electromagnetic interaction. Strong interaction. Weak interaction. Standard model. <b>Intended learning outcomes</b> The students understand the basic connections between fundamental Nuclear and Elementary Particle Physics. They have an overview of the experimental observations of Particle Physics and the theoretical models which de-						
Course	<b>S</b> (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no infoi	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Metho	d of ass	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
module is	s creditab	le for bonus)				
written	exami	nation (approx. 120 mi	nutes)			
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
		-				
Peferred to in LDO L (						
Referred to III LEOT (examination regulations for teaching-degree programmes)						
Module appears in						
Module appears In Pashalar' dagraa (a majar) Mathematics (2012)						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013)						
Bachelor' degree (1 major) Physics (2012)						
Bachelor' degree (1 major) Mathematical Physics (2012)						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2012)					
Bachelor' degree (1 major) Computational Mathematics (2013)						
Bachelor's (2012)	with 1 ma	or Computational Mathematics	JMU Würzburg • ge cord Bachelor (18	enerated 26-Aug-2024 • exam D ECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 145 / 153



# **Thesis** (11 ECTS credits)

Module title					Abbreviation	
Thesis Computational Mathematics (Bachelor Thesis)					10-M-BAC-122-m01	
Module coordinator				Module offered by	· · · · · · · · · · · · · · · · · · ·	
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathematics		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
11	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Indepe	ndently	/ researching and writing	on a topic in mathen	natics selected in co	nsultation with the supervisor.	
Intende	ed lear	ning outcomes				
The stu tained suitabl	dent is during e form.	able to work independe his/her studies in the ba	ntly on a given mathe chelor programme. H	matical topic and a e/She can write dov	pply the skills and methods ob- vn the result of his/her work in a	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
no cou	rses as	signed				
Methoo module is	<b>d of ass</b> s creditab	<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
written Langua	thesis ige of a	ssessment: German, Eng	lish if agreed upon w	ith the examiner		
Allocat	ion of <b>j</b>	olaces				
Additio	nal inf	ormation				
Worklo	ad		·			
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachel	Bachelor' degree (1 major) Computational Mathematics (2014)					
Bachel	Bachelor' degree (1 major) Computational Mathematics (2012)					
Bachelor' degree (1 major) Computational Mathematics (2013)						



# Subject-specific Key Skills

(16 ECTS credits)

Module	e title				Abbreviation	
Mathe	matics	and Computer			10-M-MCO-122-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
7	(not) s	successfully completed				
Duratio	on	Module level	Other prerequisites			
2 seme	ester	undergraduate	By way of exception, additional prerequisites are listed in the section assessments.		isites are listed in the section on	
Conten	ts					
Basics matics and nu analysi	of a mo .; introo merica s, in pa	odern programming langu duction to modern mathe l computation (e.g. Math articular differential and i	uage (e.g.C or Fortra matical software for ab); computer-based ntegral calculus; visu	n) taking into accour symbolic computation solution of problem ralisation of function	nt the particular needs in mathe- on (e.g. Mathematica or Maple) is in linear algebra, geometry, ns.	
Intende	ed lear	ning outcomes				
The stu moderr probler	ident is n matho ms.	able to work on small pr ematical software packag	ogramming exercises ges, and is able to as	s in mathematics. He sess their fields of a	e/She learns the use of advanced pplication to solve mathematical	
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
• 1 Method module is Assess low. Ur vidual	o-M-PR d of ass s creditab ment in nless st assess	RG-1-122: P (no information <b>sessment</b> (type, scope, langua le for bonus) In this module comprises ated otherwise, successfor ments.	on on SWS (weekly co ge — if other than German, o the assessments in t ful completion of the	ntact hours) and col examination offered — if no he individual modul module will require	urse language available)	
<ul> <li>Assessment in module component 10-M-COM-1-122: Computational Mathematics Computational Mathematics</li> <li>4 ECTS, Method of grading: (not) successfully completed</li> <li>project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: 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 anew.</li> </ul>						
<ul> <li>subjects <ul> <li>3 ECTS, Method of grading: (not) successfully completed</li> <li>project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course)</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: 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</li> </ul> </li> </ul>						

Bachelor's with 1 major Computational Mathematics	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data re-	page 149 / 153
(2012)	cord Bachelor (180 ECTS) Computational Mathematics - 2012	

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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 anew.

## Allocation of places

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#### Additional information

Workload

Teaching cycle

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

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#### Module appears in

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

Module title					Abbreviation		
Introduction into mathematical thinking and working 10-M-MDA-122-mo1							
Module coordinator				Module offered by			
Dean of Studies Mathematik (Mathema		atics)	Institute of Mathem	atics			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
4	(not)	successfully completed					
Durati	on	Module level	Other prerequisites				
1 seme	ester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.				
Conter	nts						
Logica tics, e.	l found g. sets	ations of mathematical p and functions; basic tec	roofs, in particular ax hniques and method	iomatic and deducti s for proving; mather	on; basic concepts i matical writing.	n mathema-	
Intend	ed lear	ning outcomes					
The stu form e oral fo	udent is asy mat rm.	acquainted with the bas thematical arguments inc	ic proof methods and dependently and pres	d techniques in math sent them adequately	ematics. He/She is y and reasonably in y	able to per- written and	
Course	<b>es</b> (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
This m compo 1	odule conent. 10-M-M 10-M-M	omprises 2 module comp DA-1-122: V + Ü (no inforn DA-2-122: V + Ü (no inforn	oonents. Information nation on SWS (week nation on SWS (week	on courses will be li ly contact hours) and ly contact hours) an	sted separately for e d course language av d course language a	ach module vailable) vailable)	
Metho	d of ass	<b>Sessment</b> (type, scope, langua	ge — if other than German, o	examination offered — if no	t every semester, informati	on on whether	
<ul> <li>low. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</li> <li>Assessment in module component 10-M-MDA-1-122: Basic Notions and Methods of Mathematical Reasoning Basic Notions and Methods of Mathematical Reasoning <ul> <li>2 ECTS, Method of grading: (not) successfully completed</li> <li>project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course)</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: 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 anew.</li> </ul> </li> </ul>							
<ul> <li>ting in Mathematics <ul> <li>2 ECTS, Method of grading: (not) successfully completed</li> <li>project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course)</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: 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</li> </ul> </li> </ul>							
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exam DECTS) Computational Mathe	n. reg. data re- matics - 2012	page 151 / 153	

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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 anew.

# Allocation of places

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# Additional information

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Workload

# Teaching cycle

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

§ 73 (1) 5. Mathematik Angewandte Mathematik

## Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Economathematics (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 Gymnasium Mathematics (2012)

Module title					Abbreviation	
Semina	ar Math	iematics			10-M-SEM-122-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathema		natics)	Institute of Mathem	atics		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	n		Other prerequisites			
Duratio	ctor	undergraduate	Other prerequisites			
1 Semester		undergraduate	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		-			
A selec	ted top	oic in mathematics.				
Intende	ed lear	ning outcomes				
The student gains first experience with independent scientific work. He/She masters elaboration and structuring of a given topic using selected literature, and prepares a talk on the subject. He/She is able to participate actively in a scientific discussion.  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 semester, information on whether module is creditable for bonus) talk (approx. 60 to 180 minutes) Language of assessment: German, English if agreed upon with the examiner						
Additional information						
Worklo	ad					
Teachi	ng cycl	e				
Referred to miller O T (examination regulations for teaching-degree programmes)						
Modulo appears in						
Recholor' degree (1 major) Mathematics (2012)						
Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (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 Gymnasium Mathematics (2012)						
Bachelor's (2012)	with 1 ma	jor Computational Mathematics	JMU Würzburg • ge cord Bachelor (180	enerated 26-Aug-2024 • exan DECTS) Computational Mathe	n. reg. data re- ematics - 2012	page 153 / 153